HIGHLIGHTS

REVISION NO. 33 Jun 01/10

Pages which have been revised are outlined below, together with the Highlights of the Revision

CH/SE/SU PAGES	C	REASON FOR CHANGE	EFFECTIVITY
CHAPTER 20			
L.E.P. 1- 4		Revised to Reflect this revision indicating new,revised, and/or deleted pages	
T. OF C. 2- 4		Revised to reflect this revision	
20-21-12 6, 8		Minor additions and amplification REVISED FIG. "TORQUE VALUES FOR EQUIPMENT INSTALLATION FASTENERS, SHEET 2/2": - ADDED TORQUE VALUES FOR NSA 5050.	
20-23-11 A 28,A 31- A 32		Minor additions and amplification ADDED "PARA.6. NOT APPLICABLE."	
20-23-12 1- 14		Minor additions and amplification ADDED TIGHTENING TORQUES FOR: - DE-ICING SYTEMS - RAIN PROTECTION SYSTEMS - FIRE EXTINGUISHING SYSTEMS - PRESSURIZATION SYSTEMS - WATER SYSTEMS - AIR DATA SYSTEMS.	
20-23-15 1- 4		Minor additions and amplification ADDED O-RING REFERENCES EN6075 AND EN6076.	
20-23-16 1- 3		Minor additions and amplification ADDED O-RING REFERENCES EN6075 AND EN6076.	
20-23-21 1- 2, 4- 6		Minor additions and amplification REVISED FIG. "IDENTIFICATION OF BOBBINS AND TOOLS": - ADDED O-RING REFERENCES EN6075 AND EN6076.	
20-26-00 1, 3		Minor additions and amplification ADDED NOTE FOR INSTALLATION OF EXPANSION JOINTS.	

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CH/SE/SU C PAGES	REASON FOR CHANGE	EFFECTIVITY
20-28-11 4, 8, 11, 13, 17, 28- 31, 34- 39, 41	Minor additions and amplification **ADDED PARA. (3)**	
20-31-00 3-A 61	Effectivity updated at the bottom of the page Minor additions and amplification **REVISED LIST OF MATERIALS REQUIRED FOR AIRCRAFT SERVICE AND MAINTENANCE.**	

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CHAPTER 20

STD. PRACT. AIRFRAME

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively
Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary

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20-31-00	R	95	Jun01/10	20-31-00	R A	46	Jun01/10				
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CHAPTER 20

STD. PRACT. AIRFRAME

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R 1. General
R The airframe standard practices chapter contains information on the use and
R application of aircraft maintenance and repair processes which are not
R specifically covered in other chapters of the Aircraft Maintenance Manual.
R It also gives the list of materials required for servicing and maintenance
R operations.

R 2. Standards Manual
R Information related to the various standards effective for all **AIRBUS** models
R are given in a separate manual called : **STANDARDS MANUAL.**
R The **STANDARDS MANUAL** contains information about all product/semi-finished
R product standards approved by the **AIRBUS** partners for the **AIRBUS** programs,
R as well as about the proprietary parts and the suppliers qualified for those
R parts.
R Moreover, the **STANDARDS MANUAL** contains a selection of the basic standards
R used on the **AIRBUS** programs.
R Standard parts which are not found in the **STANDARDS MANUAL** shall not be used
R without prior approval by **AIRBUS INDUSTRIE.**
R The **STANDARDS MANUAL** assists the customer with respect to information about
R the identification of standard parts and their procurement in co-operation
R with the **AIRBUS INDUSTRIE** spare parts center **AIRSPARES.**

R 3. Process and Material Specification Manual
R The **PROCESS AND MATERIAL SPECIFICATION MANUAL** provides basic information on
R manufacturing processes and materials which are called up in engineering
R drawings and **AIRBUS INDUSTRIE** documentation.
R It is designed to assist operators in producing their own workshop documents
R necessary to perform work on in-service **AIRBUS** aircraft. The quality of such
R work is the responsability of the Operator.

WIRELOCKING

1. General

The lockwire is installed to put tension on the wire when the parts become loose.

A. Job Set-Up

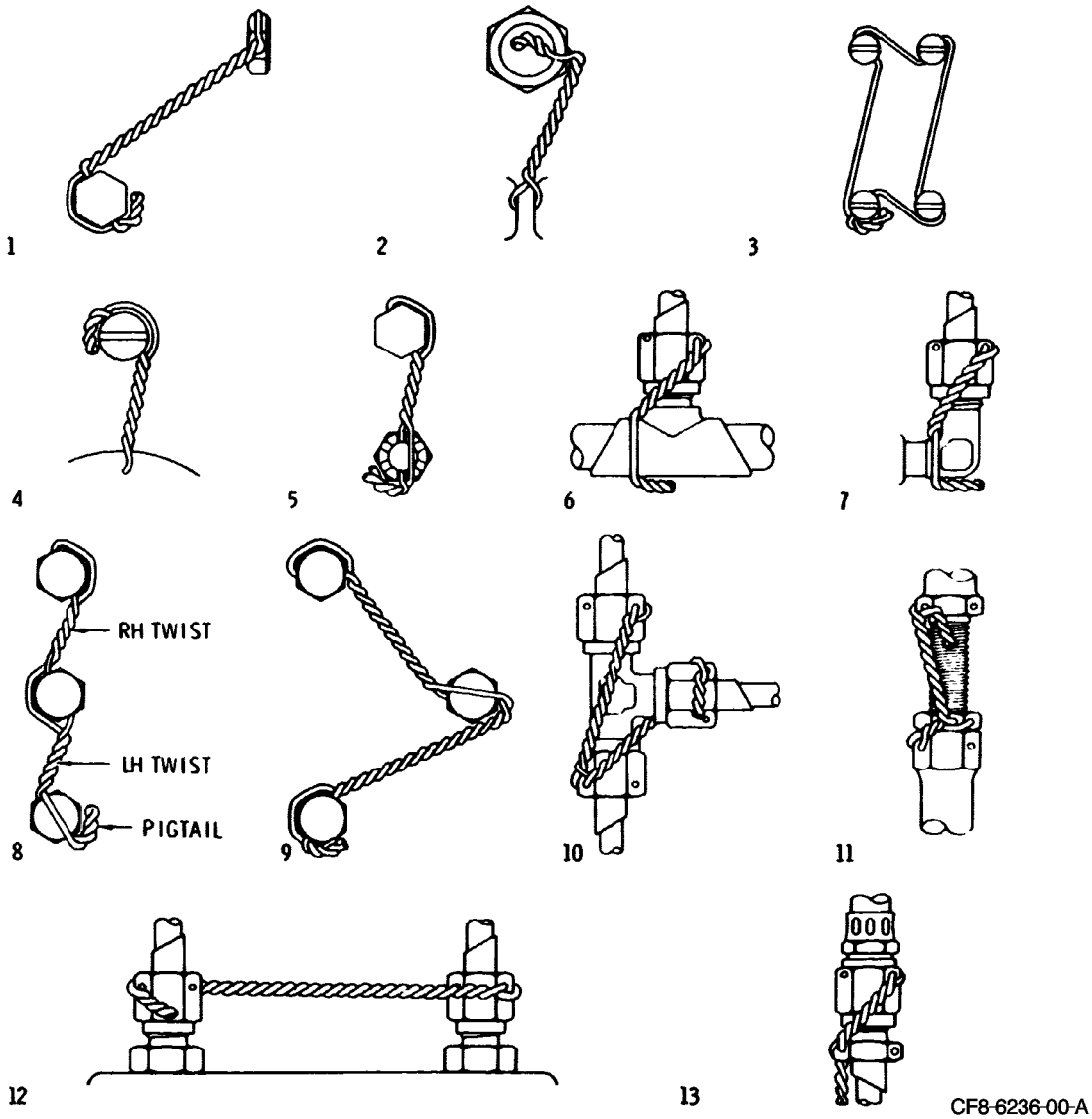
(1)Make sure that all lockwire holes have been drilled.
(2)Make sure that the assembly has been torqued to the requirements of the relevant figure.
(3)Lockwire shall be used once only.
(4)Single wirelocking is permissible if the locking length is short and lies close to the component locked.
(5)Double wirelocking is preferred and is essential if the locking length is long and unsupported and/or can become damaged.
NOTE : Wirelocking shall not be used to prevent inadvertent operations of controls or switches for any normal, standby or emergency services which may be required at any times during flight.

B. Procedure (Ref. Fig. 001)

(1)Single wirelocking
(a)Position lockwire in hole.
(b)Keep the wire taut, twist at least four times.
(c)Pass one end through the hole in the item to which locking is to run.
NOTE : Do not cut off the unused end until the wirelocking operation is completed.
- it may be used if the first end breaks.
(d)Bend the wire back through 180° and thread it under itself.
(e)Draw the wire tight and thread the end under at least two more times, making a minimum of two turns up to a maximum of four.
(2)Double wirelocking
(a)Insert the lockwire through the hole in the first part and the ends equalized and bent around the head of the part.
(b)Twist the strands, while taut, until the twisted part is just short of the hole in the next unit.
The twisted portion should be within 3 mm (0.125 in.) from the hole in either unit.
NOTE : The direction of wrap and twist of the strands shall be such that the loop around the part comes under the strand protruding from the hole so that the loop will stay down and will not tend to slip up and leave a slack loop.
(c)Insert the uppermost strand through the hole is the second unit and follow the above procedure.
(d)After wiring the last unit, continue twisting the wires to form a pigtail of three to five twists.
(e)Bend the cut ends of the pigtail in towards the item in such a manner as to prevent them becoming a snag.
(3)Close-up
(a)Trim off the remaining wire and discard.
(b)Remove all pieces of off-cut wire from the aircraft structure.
(c)Check that locking is tight.

(d)Check that the wire shows no signs of kinking, peeling and other types of damage.

(e)If no protection has been applied in the wire holes before installation you must inject the adequate protective compound after wire installation. (Material No. 05-002, Material No. 05-027C).



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Wirelocking Practices
Figure 001

1. Handling Precautions for Electrostatic Discharge Sensitive Devices

A. Handling Precautions

(1) Only the Cabin and Flight Crew Call System has electrostatic discharge sensitive devices.
For this system, obey the precautions specified in the AMM in the applicable Removal/Installation section.
For example, "...connect one hand to ground by antistatic wrist strap."

(2) For all the other systems

(a) There are no specific procedures or instructions related to this subject because :

- the LRUs have sufficient built-in protection to prevent electrostatic discharge damage.
- no protective electrostatic discharge handling procedures are necessary unless the LRU housing is open.
  For example, antistatic or conductive protective caps are not necessary for connectors on the LRU housing (standard caps are sufficient).
- no electrostatic discharge sensitive devices printed circuit boards are LRUs. Thus it is not necessary to use wrist straps.
  NOTE : On Board Replaceable Modules (OBRMs) are not LRUs. It is necessary to wear wrist straps for the Installation/replacement of OBRMs.
- the necessary standard precautions for each LRU are specified in the AMM in the applicable Removal/Installation section.
  For example, "Put the blanking caps on the fixed connector and on the LRU connector(s)."

1. Circuit Breakers Safety Practices

A. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedure - 20-21-12, P. Block 1	Tightening Torque for Standard Threaded Fasteners

B. Circuit Breakers Safety Practices

It is necessary to safety an open circuit breaker with safety clips (P/N ABS0772 or equivalent) when:

- there is work on an electrically controlled or supplied system during maintenance.
- such a system is deactivated and not serviceable.

NOTE : The manufacturer recommends safety clips P/N ABS0772, but the operator can use equivalents that obey the requirements given in this document.

It is important to use safety clips that:

- are easy to install and remove
- do not cause damage to the circuit breaker or circuit breaker panel.

It is always better to use plastic safety clips because they prevent the risk of accidental short circuits (if they fall in an electrical panel, for example).

(1)Maintenance

(a)There is a risk of injury and damage to equipment and/or the aircraft if persons do work on electrically energized equipment or systems.

(b)Before maintenance work starts on electrical equipment or an electrical system, it is a safety practice to identify, open, safety and tag the circuit breakers related to the equipment or system(s).

This prevents the supply of electrical power to the equipment/system(s) and the risk of:

- electrical shocks that can occur when there is contact with energized wiring connections, terminals, etc.
- short circuits that can occur when metal tools or parts make accidental contact between energized wiring, terminals, contacts, etc.

1 To make sure that an open circuit breaker remains open, it is necessary to install a safety clip (P/N ABS0772B01A (4.6 mm (0.1811 in.) depth), P/N ABS0772B02A (7.6 mm (0.2992 in.) depth) (white color) or equivalent) and a safety tag on the circuit breaker (between the circuit breaker button and the circuit breaker panel).

R

(2)Operation

(a)During aircraft operation, it can be necessary to prevent the operation of an electrical system (for example, an optional system with wiring provision that is not activated or a system that is deactivated because of MMEL requirements).

1 To prevent the accidental energization of such systems, it is a safety practice to install safety clips (P/N ABS0772A01A (4.6 mm (01811 in.)
R depth), P/N ABS0772A02A (7.6 mm (0.2992 in.) depth) (red color) or equivalent) on the related circuit breakers.

2 When these safety clips are installed, it must be possible to see the complete circuit breaker panel and all the placards.

(3)Tightening torques for circuit breakers

(a)Make sure that you apply the correct tightening torque when you attach/connect a circuit breaker (Ref. 20-21-12, P. Block 1).

R **WARNING : DO NOT TOUCH CONNECTIONS TO THE AIRCRAFT, DO NOT USE HEADSETS.**
R **LIGHTNING STRIKE AND HIGH DISCHARGE CURRENTS ARE VERY DANGEROUS FOR**
R **PERSONNEL AND CAN CAUSE DAMAGE TO EQUIPMENT.**

1. Maintenance in Storm Conditions - Safety Practices

A. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedure	
- 05-51-18, P. Block 1	Inspection After Lightning Strike
- 24-00-00, P. Block 301	General

B. Safety Precautions

(1) During storm conditions, or when there is atmospheric electrical
R activity:
R - stop ground servicing operations external to the aircraft,
R - remove/disconnect headsets,
R - make sure that the aircraft is grounded (Ref. 24-00-00, P. Block 301),
R - do not touch metal parts, equipment or connections to the aircraft.

R If a lightning strike occurs, do an inspection after lightning strike
R (Ref. 05-51-18, P. Block 1).

THREADED FASTENERS

1. General

This section includes the following data :

- Identification of threaded fasteners (Ref. 20-21-11).
- Tightening torques to be applied to standard threaded fasteners (Ref. 20-21-12).
- Rejection criteria (Ref. 20-21-13).

IDENTIFICATION

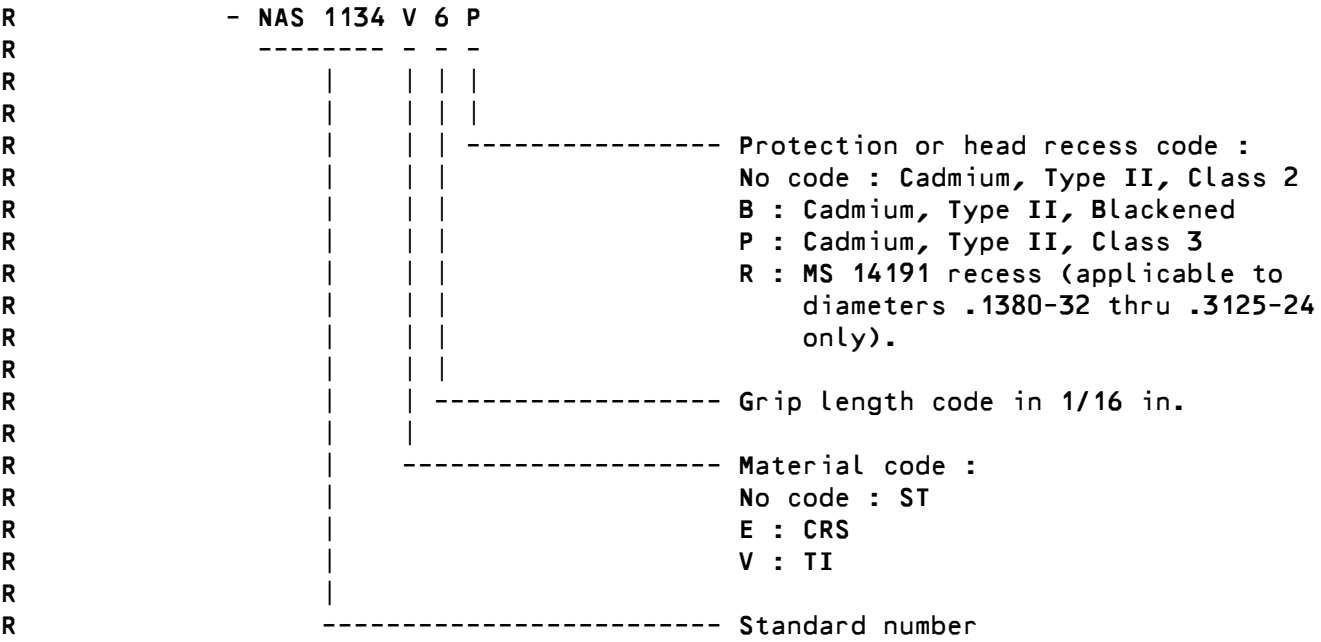
1. General

Screws are reference marked by the ASN (Aerospatiale Standard Norme) or NSA (Norme Sud-Aviation) reference number on the head, except Taper-locks which are marked TL.
This specification indicates the quality of materials used.

2. Specification

The NSA specification for hardware consists of a four-figure number according to the type of bolt.

e.g. - NSA 5022 = Countersunk bolt head F100 = close tolerance


- NAS 1134 V 6 P
Protection or head recess code :
No code : Cadmium, Type II, Class 2
B : Cadmium, Type II, Blackened
P : Cadmium, Type II, Class 3
R : MS 14191 recess (applicable to diameters .1380-32 thru .3125-24 only).
Grip length code in 1/16 in.
Material code :
No code : ST
E : CRS
V : TI
Standard number

The ASN specification consists of one letter A, B or E (functional identifier) and one four-figure number

e.g. ASN - A - 2001 - Countersunk bolt head F100

3. Precautions to be Observed While Removing Bolted Components

Several bolt diameters and/or lengths may be covered by the same NSA Specification

e.g. NSA 5022 - 4 - 12
4 = diameter
12 = length

4. Correspondance Table for Standard Hardware Specifications

NOTE : Torque values do not change although the protection is different for the ASN - A specifications and the other specifications.

(Ref. Fig. 001, 002, 003)

DESIGNATION	ASN	OTHERS	PROTECTIONS ASN	PROTECTIONS OTHERS	REMARKS
BOLT – HEXAGONAL HEAD	ASN–A2000	NAS 1303 TO 1320	Al + Lub.	Cd Pl	
	ASN–A2000V	NAS 6403 TO 6420	Al + Lub.	Cd Pl	
BOLT – CSK HEAD	ASN–A2001	NSA 1153 TO 1158	Al + Lub.	Cd Pl	NAS 1151 – NAS 1152 NO CORRESPONDANCE
	ASN–A2001V	NAS 1153VP TO NAS 1158VP	Al + Lub.	Cd Pl	NAS 1151VP – NAS 1152VP NO CORRESPONDANCE
		NAS 1153E TO NAS 1158E		NONE	STAINLESS STEEL
TENSION BOLT – 12 POINT	ASN–A2002	MS 21250	Al + Lub.	Cd Pl	

NOTE : Al : Aluminium
LUB : Lubrication
Cd Pl : Cadmium plating
Ox An : Anodic Oxydation
Sul : Sulfuric

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R

Correspondance Table for Standard Hardware Specifications
Figure 001

DESIGNATION	ASN	OTHERS	PROTECTIONS ASN	PROTECTIONS OTHERS	REMARKS
HI-LOCK PIN 100° - FLUSH SPECIAL SHEAR HEAD	ASN-A2003	NSA 5040	Al + Lub	Cd Pl	STEEL ALLOY
	ASN-A2003V	NSA 5040V	Al + Lub	Spec 306 + Lub	TITANIUM ALLOY
		NSA 5040C		Passivation	STAINLESS STEEL
		NSA 5040VP		Cd Pl	TITANIUM
HI-LOCK PIN - PROTRUDING TENSION HEAD	ASN-A2004	NSA 5041	Al + Lub	Cd Pl	STEEL ALLOY
	ASN-A2004V	NSA 5041V	Al + Lub	Spec 306 + Lub	TITANIUM ALLOY
		NSA 5041C		Passivation	STAINLESS STEEL
BOLT HEXAGONAL HEAD FULL THREAD	ASN-A2006	NAS 1096	Al + Lub	Cd Pl	STEEL ALLOY
BOLT UNIV. HEAD - FULL THREAD	ASN-A2007	NAS 1100-NAS 1101	Al + Lub	Cd Pl	STEEL ALLOY
HI-LOCK PIN - 100° CSK SHEAR HEAD	ASN-A2008	NSA 5350	Al + Lub	Cd Pl + Lub	STEEL ALLOY
	ASN-A2008V	NSA 5350V	Al + Lub	Ox. An. Sul. + Lub	TITANIUM ALLOY
HI-LOCK PIN - PROTRUDING TENSION HEAD	ASN-A2009	NSA 5351	Al + Lub	Cd Pl + Lub	STEEL ALLOY
	ASN-A2009V	NSA 5351V	Al + Lub	Ox. An. Sul. + Lub	TITANIUM ALLOY
BOLT - CSK HEAD	ASN-A2010	NSA 5452	Al + Lub	Cd Pl	STEEL ALLOY
BOLT - 12 POINT HEAD	ASN-A2011	NSA 5453	Al + Lub	Cd Pl	STEEL ALLOY
TAPER LOCK BOLT - CSK HEAD	ASN-A2012V	NSA 5092V	Al + Lub	Ox. An. Sul. + Lub	TITANIUM ALLOY
TAPER LOCK BOLT - PROTRUDING SHEAR HEAD	ASN-A2013V	NSA 5093V	Al + Lub	Ox. An. Sul. + Lub	TITANIUM ALLOY
BOLT UNIV. HEAD - FULL THREAD	ASN-A2014	NAS 600 à 604	Al + Lub	Cd Pl	STEEL ALLOY

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Correspondance Table for Standard Hardware Specifications
Figure 002

R

DESIGNATION	ASN	OTHERS	PROTECTIONS ASN	PROTECTIONS OTHERS	REMARKS
BOLT CSK HEAD – FULL THREAD	ASN–A2015	NAS 1102	Al + Lub	Cd Pl	STEEL ALLOY
		NAS 1102C		NONE	STAINLESS STEEL
BOLT UNIV. HEAD	ASN–A2016	NAS 1131 TO NAS 1138	Al + Lub	Cd Pl	STEEL ALLOY
	ASN–A2016V	NAS 1131V TO NAS 1138V	Al + Lub	Cd Pl	TITANIUM
		NAS 1131E TO NAS 1138E		NONE	STAINLESS STEEL
SHOULDER PIN	ASN–A2017	NSA 5042	Al + Lub	Cd Pl	STEEL ALLOY
BOLT CSK HEAD – FULL THREAD	ASN–A2018	NAS 514	Al + Lub	Cd Pl	STEEL ALLOY
TITANIUM RIVET – CSK HEAD	ASN–A2019	NSA 5406	Al	Sul.An.Ox.	TITANIUM T 40
TITANIUM RIVET – UNIV. HEAD	ASN–A2020	NSA 5407	Al	Sul.An.Ox.	TITANIUM T 40
SEALING BOLT – CSK HEAD	ASN–A2022		Cd Pl		STEEL ALLOY
BOLT CSK HEAD	ASN–A2060		Cd Pl		STEEL ALLOY
BOLT – 12 POINT HEAD	ASN–A2061		Cd Pl		STEEL ALLOY
BOLT CSK HEAD	ASN–A2062 *	NSA 5337	Cd Pl	Ni. Cd.	STEEL ALLOY * only 1 item dia (10)
BOLT – 12 POINT HEAD	ASN–A2063		Cd Pl		STEEL ALLOY

Correspondance Table for Standard Hardware Specifications
Figure 003

TIGHTENING TORQUES OF STANDARD THREADED FASTENERS

1. General

This subject gives the different tightening torques applicable to the standard screw heads and nuts. It also gives the correction coefficient that you must use when you apply a lubricant to install the fasteners.
The applicable torques are given in the maintenance procedure.
The torque values are applicable for the first and the second oversize of the same screw/nut assembly.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Torque Wrench : range 0.1 to 0.2 m.daN (8.84 to 17.69 lbf.in)
B. Material No. 07-020	Lacquers (Ref. 20-31-00)
Referenced Procedure - 51-43-00, P. Block 1	SRM - Torque Values

3. Procedure

A. General

(1) The threaded fasteners are identified with a standard number written on the head (example : ABS, AN, ASNA, NAS, ASN, NSA, MS). They are installed in standard conditions and lubricated.

(2) Be careful when you remove threaded fasteners.
Before you apply a tightening torque to a fastener, make sure that you know its correct part number.
To find the correct part number of a fastener (screw, washer, nut), refer to the installation figure of the IPC.

(3) The torque values of the nuts and the screws are given with their initial lubricants.
These torque values are available for the different screw/nut diameters :
- The minimum value.
- The nominal value.
- The maximal value.

(4) Installation of used screws and nuts :

(a) If you use screws and nuts again:
- The preload is weaker because the effect of the lubricant decreases.
- It causes local damage to the protection of the screws and nuts which can cause corrosion (nuts and screws in plated steel) or seizure (nuts and screws in titanium or stainless steel).
- It can cause damage to the mating surfaces.
- It can decrease the torque for self-locking nuts.

(b) To use nuts and screws again, obey the conditions that follow :
- Do not use aluminum nuts again.
- For other materials, make sure that the screws and nuts are serviceable (get approval from your Quality Department or a qualified mechanic).
- The protection (or the fasteners) must not be damaged. (Examine the

threads of the screw and the nut, the mating surfaces of the nut and the wrench, the shank and the head of the screw).

(5)Tightening Procedures.

(a)Apply the tightening torques with :

- Torque wrenches.
- Calibrated screwdrivers.

(b)If you use torque wrenches or calibrated screwdrivers, make sure that :

1 The calibration of the tools is correct.

2 The torque is applied correctly. You can apply unwanted torsion or flexion to the component if :

- The position of the wrench (or the screwdriver) is incorrect.
- You apply the tightening torque incorrectly :
  This can change the tightening torque and, thus, the preload.

NOTE : If you use a screwdriver, you must tighten at the correct speed to prevent too much heat on the fasteners. This can cause damage to the protection and the lubricant and can make the fastener seize.

- The attachment of the component is correct :
  Make sure that the component is attached correctly before you apply the maximum torque.

3 You get a correct part mating for a good fatigue of the joints.

(c)Do not apply more than the maximum torque value.

(d)Make sure that you get correct part mating before the maximum torque value is applied.

(e)Tightening of screws and nuts with a torque wrench and an adapter. (Ref. Fig. 001)

1 When you can only tighten with an adapter, obey these instructions :

a Adjust the adapter until the center of the hexagonal socket or the jaws is aligned with the axis of the torque wrench.
The angle of offset must not be more than 15 degrees.

b To prevent possible errors, the length of the adapter must be less than the length of the torque wrench.

c When you use an adapter, the value shown on the dial of the torque wrench is not the applied value. To get the correct value T2, apply this formula :

$$T2 = \frac{T1 \times A}{A + B}$$

T1 : Value that you must apply on the nut.
A : Length of the torque wrench.
B : Length of the adapter.
T2 : Torque wrench dial reading.

NOTE : This formula is correct only when the torque wrench and the adapter are aligned.

4. Tightening Torque

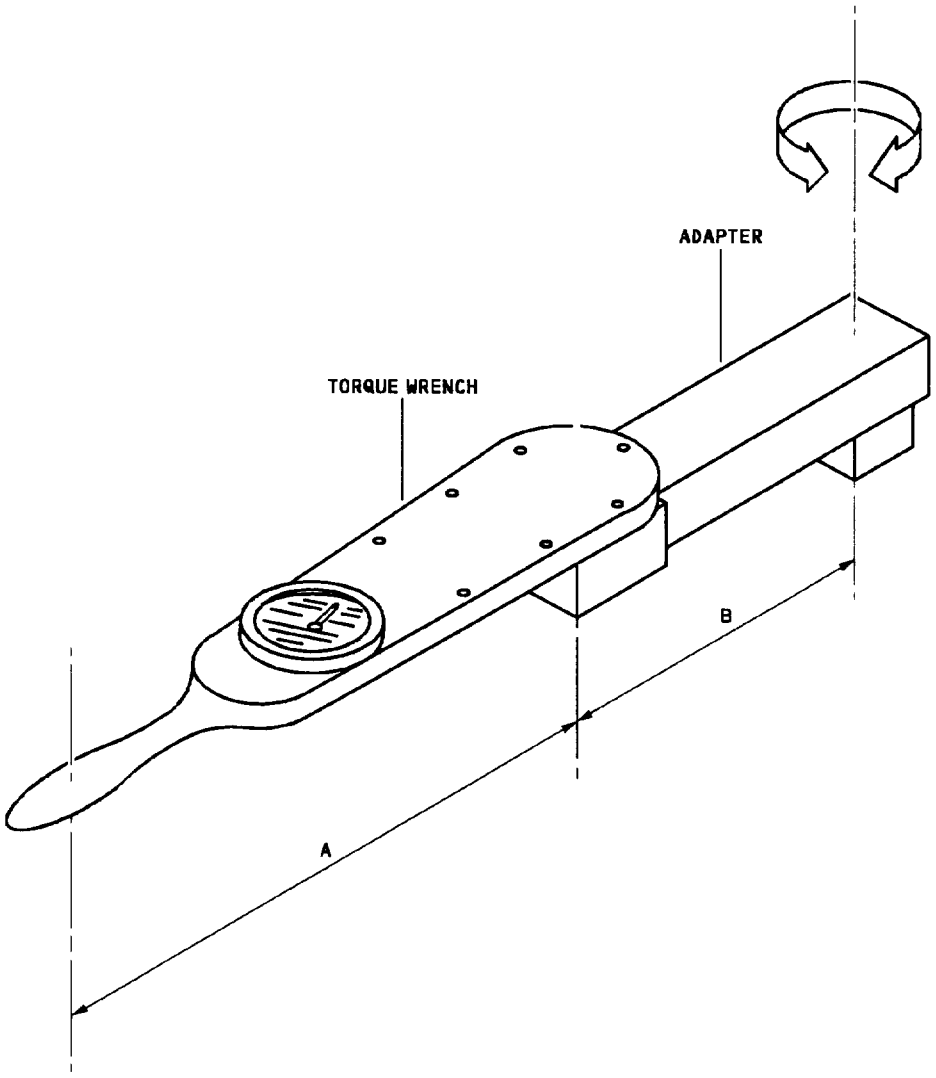
A. Tightening Torque for the Screws and the Nuts

(1)Tightening by the nuts. (Ref. Fig. 002, 003)

- If you cannot tighten by the nut, increase by 20 % the values given in the figures.

(2)Tightening by the screw (captive nut).
(Ref. Fig. 004)
You can tighten by the screw only when the screw is installed in a hole with clearance fit.
(3)Tightening of castellated nuts.
If the torque values tolerance does not let you put a slot opposite a hole for a cotter pin, you can :
- Decrease the minimum torque by 10 %.
- Install a washer below the nut.
- Replace the nut.
You can drill the screw during the installation.
Make sure that you do not decrease the strength of the screw (Specially for offset drilling, the diameter of the bore must be correct, deburr lightly).
You must prevent corrosion (Put grease in the hole of the nut when you install steel bolts).
NOTE : We recommend that you use screws with their initial drill holes.
(4)Installation of self-locking nuts.
(Ref. Fig. 005)
(a)Procedure for the installation of self locking nuts (ASNA 2028 - ASNA 2528), (ASNA 2036 - ASNA 2536), (ASNA 2037 - ASNA 2537) and (ASNA 2038 - ASNA 2538) with interfay sealant.
When the fasteners (screws/nuts) are installed on uncured interfay sealant, the fasteners can loose their preload after curing because the sealant does not flow immediately. This is why you must tighten them again.
The first tightening is got when the outer hexagonal part is sheared off.
You must apply the torque values specified in the given procedure (Ref. SRM 514300).
1 5 or 10 minutes after the initial tightening, or
2 before the sealant is cured.
(5)The tightening torques of the TAPERLOK, HI-LOK and HI-LITE screws are specified in the given procedures (Ref. SRM 51-43-00, P. Block 1).
(6)Tightening of shoulder screws.
(Ref. Fig. 006)
(a)Tighten by the nut.
(b)The minimum torque that applied is to between 0.1 and 0.2 m.daN (8.84 and 17.69 lbf.in). If you do not apply this minimum torque, the washer can become loose.
If you install a castellated nut, the tightening torque tolerance does not always let you align the castellated nut with the hole of the cotter pin.
If you cannot align the castellated nut with the hole of the cotter pin, install a steel teflon washer NSA5305 and a nut NSA5060.

B. Tightening Torques for Electrical Components
(1)Functions
(a)The application of tightening torques on electrical component fasteners permits :
- the electrical and mechanical connection of a terminal to the



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Torque Wrench/Adaptor Combination
Figure 001

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TIGHTENING BY NUT(1)					
SCREW		NAS 1131 TO 1138 NAS 1151 TO 1158 NAS 1303 TO 1312 NAS 1100-NAS 1102 NAS 6603 TO 6612 NAS 6303 TO 6312	NAS 1131E TO 1138E NAS 1151E TO 1158E NAS 6703 TO 6712 NAS 1100E-NAS 1102E NAS 1635 ASNA 2000V	ASNA 2001T ASNA 2000T ASNA 2016V ASNA 2001V(2) ABS 0114T ABS 0114V(2)	NAS 1131VP TO 1138VP NAS 1151VP TO 1158VP NAS 6403 TO 6412
NUT		NAS 1726E/CSE NSA 5457E/CPE NAS 1727E/AE NAS 1727CE/KE NSA 5050 - NSA 5050C MS 21042/21043 NAS 1291 C - ASNA 2021 CE	NAS 509 NAS 509C		AN 316 AN 316C
DIA		m.daN (lbf.in.)	m.daN (lbf.in.)		m.daN (lbf.in.)
CODE	mm (in.)				
6.32	3.5 (9/64)	0.14-0.16-0.17 (12-14-15)			
8.32	4.16 (21/128)	0.20-0.24-0.25 (17.7-21-22)			
3	4.82 (3/16)	0.36-0.41-0.43* (31.8-36-38*)	0.30-0.34-0.36 (26.5-30-31.8)		0.3-0.32-0.35 (26.5-28-31)
4	6.35 (1/4)	0.75-0.85-0.90 (66.3-75-79.6)	0.62-0.71-0.75 (54.8-62.8-66)		0.6-0.65-0.7 (53-57.5-62)
5	7.92 (5/16)	1.30-1.47-1.55 (115-130-137)	1.08-1.23-1.30 (95.6-108.8-115)		1.2-1.27-1.35 (106-112-119)
6	9.52 (3/8)	2.69-3.04-3.22 (238-261.5-285)	1.87-2.12-2.24 (165.5-187.6-198)		1.75-1.87-2 (155-165.5-177)
7	11.1 (7/16)	3.87-4.38-4.64 (342-376-410)	2.24-2.54-2.69 (198-218-238)		2.4-2.55-2.7 (212-225.6-239)
8	12.7 (1/2)	5.57-6.32-6.69 (493-542.5-592)	3.22-3.65-3.87 (285-313.5-342)		3.1-3.35-3.6 (274-296-297)
9	14.3 (9/16)	6.69-7.58-8.02 (592-651-710)	3.87-4.38-4.64 (342-376-410)		4.4-4.5-4.6 (354-398-407)
10	15.9 (5/8)	9.63-10.87-11.5 (852-934.5-1017)	4.64-5.26-5.57 (410-451.5-493)		5.1-5.5-5.9 (451-486.7-522)
12	19.05 (3/4)	13.87-13.08-16.64 (1227-1349.5-1472)	8.02-9.09-9.63 (710-781-852)		8.2-8.8-9.5 (726-778.7-840.7)

NOTE(1): TIGHTENING TORQUES ARE APPLICABLE TO BOLTS AND NUTS WITH THEIR INITIAL LUBRICANTS

NOTE(2): THESE BOLTS ARE NOT APPROVED FOR CARBON STRUCTURES

*CAUTION: 0.28 TO 0.37m.daN (25 TO 33lbf.in.) ONLY FOR SCREWS | ASNA 2001V, ASNA 2016V, ASNA 2000V, ABS 0114V

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Torque Values for Equipment Installation
Fasteners, Sheet 1/2
Figure 002

R

TIGHTENING BY NUT(1)						
SCREW		NAS 1131 TO 1138 NAS 1151 TO 1158 NAS 1303 TO 1312 NAS 1100-NAS 1102 NAS 6603 TO 6612 NAS 1131VP TO 1138VP NAS 1151VP TO 1158VP	NAS 1131E TO 1138E NAS 1151E TO 1158E NAS 6703 TO 6712 NAS 1100E-NAS 1102E NAS 1635 NAS 6303 TO 6312 NAS 6403 TO 6412	ASNA 2000T ASNA 2001V ASNA 2016V ABS 0114T ABS 0114V	NAS 1096 NAS 514	
NUT		NSA 5059 NSA 5059C	NAS 5060 NAS 5060C		NAS 17265E/CSE MS 21042/21043 NAS 1291C	NSA 5050
DIA		m.daN (lbf.in.)	m.daN (lbf.in.)		m.daN (lbf.in.)	
CODE	mm (in)					
6.32	3.5 (9/64)				0.14-0.16-0.17 (12-14-15)	
8.32	4.16 (21/128)				0.21-0.25-0.28 (19-22-25)	
3	4.82 (3/16)	0.14-0.16-0.17 (12-14-15)	0.30-0.34-0.36 (26.5-30-31.8)		0.37-0.42-0.47* (33-37.5-42*)	
4	6.35 (1/4)	0.30-0.34-0.36 (26.5-30-31.8)	0.62-0.71-0.75 (54.8-62.8-66)			
5	7.92 (5/16)	0.62-0.71-0.75 (54.8-62.8-66)	1.30-1.47-1.55 (115-130-137)			
6	9.52 (3/8)	1.08-1.23-1.30 (95.6-108.8-115)	1.87-2.12-2.24 (165.5-187.6-198)			
7	11.1 (7/16)	1.55-1.76-1.87 (137-155.7-165.5)	2.69-3.04-3.22 (238-261.5-285)			
8	12.7 (1/2)	1.87-2.12-2.24 (165.5-187.6-198)	3.87-4.38-4.64 (342-376-410)			
9	14.3 (9/16)	3.22-3.65-3.87 (285-313.5-342)	5.57-6.32-6.69 (493-542.5-592)			
10	15.9 (5/8)	4.64-5.26-5.57 410-451.5-4.93	6.69-7.58-8.02 (592-651-710)			13.87-1525-16.64 (1228-1348-1473)
12	19.05 (3/4)	6.69-7.58-8.02 (592-651-710)	9.63-10.87-11.5 (852-934.5-1017)			

NOTE(1): TIGHTENING TORQUES ARE APPLICABLE TO BOLTS AND NUTS WITH THEIR INITIAL LUBRICANTS

NOTE(2): THESE BOLTS ARE NOT APPROVED FOR CARBON STRUCTURES

*CAUTION: 0.28 TO 0.37m.daN (25 TO 33lbf.in.) ONLY FOR SCREWS | ASNA 2001V, ASNA 2016V, ASNA 2000V, ABS 0114V

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Torque Values for Equipment Installation
Fasteners, Sheet 2/2
Figure 002

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TIGHTENING BY NUT -TENSION BOLT-					
SCREW		MS 21250	NSA 5378(1) NSA 5378A(1)	ASNA 0122(1) ASNA 0122A(1) ASNA 0143(1) ASNA 0143A(1)	NSA 5166(1)
NUT		NSA 5057	ASNA 0094 ASNA 0094N NSA 5373	ASNA 0094 ASNA 0094N NSA 5373	NSA 5167
DIA		m.daN (lbf.in.)	m.daN (lbf.in.)	m.daN (lbf.in.)	m.daN (lbf.in.)
CODE	mm (in.)				
3	4.82 (3/16)	0.37-0.42-0.48 (33-37.5-42)			
4	6.35 (1/4)	0.82-0.94-1.06 (72-83-94)	1.06-1.22-1.38 (94-108-122)	0.82-0.94-1.06 (72-83-94)	1.06-1.22-1.38 (94-108-122)
5	7.92 (5/16)	1.79-2.01-2.24 (158-178-198)	1.79-2.01-2.24 (158-178-198)	1.79-2.01-2.24 (158-178-198)	
6	9.52 (3/8)	3.22-3.54-3.87 (285-313.5-342)	3.87-4.25-4.64 (342-376-410)	3.22-3.54-3.87 (285-313.5-342)	3.87-4.25-4.64 (342-376-410)
7	11.1 (7/16)	4.64-5.10-5.57 (410-451.5-493)	5.57-6.13-6.69 (493-542.5-592)	4.64-5.10-5.57 (410-451.5-493)	5.57-6.13-6.69 (493-542.5-592)
8	12.7 (1/2)	8.02-8.82-9.63 (710-781-852)	9.63-10.56-11.50 (852-934.5-1017)	8.02-8.82-9.63 (710-781-852)	9.63-10.56-11.50 (852-934.5-1017)
9	14.3 (9/15)	11.5-12.68-13.87 (1017-1122-1227)	13.87-15.25-16.64 (1227-1391-1472)	11.5-12.68-13.87 (1017-1122-1227)	13.87-15.25-16.64 (1227-1391-1472)
10	15.9 (5/8)	13.87-15.25-16.64 (1227-1391-1472)	19.97-21.96-23.96 (1767-1943.5-2120)	13.87-15.25-16.64 (1227-1391-1472)	19.97-21.96-23.96 (1767-1943.5-2120)
12	19.05 (3/4)	23.96-26.35-28.75 (2120-2331.5-2544)	34.50-37.95-41.40 (3052-3357.5-3663)	23.96-26.35-28.75 (2120-2331.5-2544)	34.50-37.95-44.40 (3052-3357.5-3663)
14	22.2 (7/8)	41.40-45.5-49.70 (3663-4030-4397)	59.64-65.60-71.57 (5276-5804-6332)	41.40-45.5-49.70 (3663-4030-4397)	
16	25.4 (1)		90-95-100 (7965-8406.5-8849)	59.64-65.60-71.57 (5276-5804-6332)	

NOTE(1): TIGHTENING TORQUE APPLICABLE FOR COMPULSORY INSTALLATION WITH GREASE (MATERIAL N°04-004) OR (MATERIAL N°04-004A) (HOT AREAS) ON SCREWS OR NUT THREADS.

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Torque Values for Removal Structural Fasteners, Sheet 1/2
Figure 003

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TIGHTENING BY NUT -TENSION BOLT-						
SCREW		NSA 5452 NSA 5453 NSA 5168 NSA 5170	NSA 5172 NSA 5387	NSA 5168 NSA 5170	ASNA 0092 ASNA 0123 ASNA 0124	ASNA 0093
NUT		NSA 5094 NAS 1726E/CSE NAS 5457E/CPE NAS 1727CE/KE NAS 1727E/AE	NSA 5174	NSA 5171 NSA 5174	NAS 1726CSE NAS 1727CE NSA 5050	NSA 5050
DIA		m.daN (lbf.in.)	m.daN (lbf.in.)	m.daN (lbf.in.)	m.daN (lbf.in.)	
CODE	mm (in)					
3	4.82 (3/16)	0.28-0.32-0.37 (25-29-33)	0.37-0.42-0.48 (33-37.5-42)		0.28-0.32-0.37 (25-29-33)	
4	6.35 (1/4)	0.63-0.72-0.82 (56-64-72)	0.82-0.94-1.06 (72-83-94)		0.63-0.72-0.82 (56-64-72)	
5	7.92 (5/16)	1.38-1.58-1.79 (122-140-158)	1.79-2.01-2.24 (158-178-198)		1.38-1.58-1.79 (122-140-158)	
6	9.52 (3/8)	2.24-2.46-2.69 (198-218-238)	3.22-3.54-3.87 (285-313.5-342)		2.24-2.46-2.69 (198-218-238)	
7	11.1 (7/16)	4.64-5.10-5.57 (410-451.5-493)	5.57-6.13-6.69 (493-542.5-592)		4.64-5.10-5.57 (410-451.5-493)	
8	12.7 (1/2)	6.69-7.35-8.02 (592-651-710)	8.02-8.82-9.63 (710-781-852)		6.69-7.35-8.02 (592-651-710)	
9	14.3 (9/15)	9.63-10.56-11.5 (852-934.5-1017)	13.87-15.25-16.64 (1227-1350-1472)	11.5-12.68-13.87 (1017-1122-1227)	9.63-10.56-11.5 (852-934.5-1017)	
10	15.9 (5/8)	13.87-15.25-16.64 (1227-1350-1472)	19.97-21.96-23.96 (1767-1943-2120)	16.64-18.30.-19.97 (1472-1619-1767)	13.87-15.25-16.64 (1227-1350-1472)	
12	19.05 (3/4)	23.96-26.35-28.75 (2120-2331.5-2544)	28.75-31.62-34.50 (2544-2798-3053)		23.96-26.35-28.75 (2120-2331.5-2544)	

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NOTE(1): TIGHTENING TORQUE APPLICABLE FOR COMPULSORY INSTALLATION WITH GREASE (MATERIAL N°04-004) OR (MATERIAL N°04-004A) (HOT AREAS) ON SCREWS OR NUT THREADS.

Torque Values for Removal Structural Fasteners, Sheet 2/2
Figure 003

R

CAPTIVE NUT SCREWING(1)					
SCREW	ASNA 2358 NAS 600 TO 604 NAS 1131VP TO 1138VP NAS 1151V TO 1158V NAS 6403 TO 6420	NAS 1303 TO 1312(2) NAS 1151 TO 1158(2) NAS 1131 TO 1138 NAS 1100 NAS 1102 NAS 6603 T0 6612	NAS 6703 TO 6720 NAS 6303 TO 6320 NAS 1151E TO 1158E NAS 1131E TO 1138E NAS 1100E NAS 1102E NAS 1635 NAS 514 NAS 1096	ASNA 2000V ASNA 2016V ASNA 2000T ASNA 2001T ASNA 2001V(2) ASNA 2358 ABS 0114T ABS 0114V(2) ABS 0376	
NUT	MS 21047 TO 21062 MS 21069 TO 21076 MV 21086 TO 21087 MS 21063 ABS 0804 ABS 0365	NSA 5051 NSA 5055 NSA 5067 NSA 5067C NSA 5084 NSA 5456	NSA 5066 NSA 5078 NAS 1870 NAS 577B NAS 1473A NAS 1473F	NAS 1474A NAS 1474F NAS 1791A NAS 1791C NAS 1792A NAS 1792C	NAS 1068A NAS 1068CM NAS 577 NAS 1473 NAS 1473C NAS 1791A
DIA		m.daN (lbf.in.)			
CODE	mm (in.)				
6-32	3.5 (9/64)	0.13-0.15-0.17 (12-13.5-15)			
8-32	4.16 (21/128)	O.22-0.25-0.38 (19-22-25)			
3	4.82 (3/16)	0.37-0.42-0.48* (33-37.5-42*)			
4	6.35 (1/4)	0.82-0.94-1.06 (72-83-94)			
5	7.92 (5/16)	1.79-2.01-2.24 (158- 178 -198)			
6	9.52 (3/8)	2.69-2.95-3.22 (238-261.5-285)			
7	11.1 (7/16)	3.87-4.25-4.64 (342-376-410)			

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NOTE(1): TIGHTENING TORQUES ARE APPLICABLE TO BOLTS AND NUTS WITH THEIR INITIAL LUBRICANTS

NOTE(2): THESE BOLTS ARE NOT APPROVED FOR CARBON STRUCTURES

*CAUTION: 0.28 TO 0.37m.daN (25 TO 33lbf.in.) ONLY FOR SCREWS | ASNA 2001V, ASNA 2016V, ASNA 2000V, ABS 0114V

Torque Values for Equipment Installation Fasteners
Figure 004

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TIGHTENING BY NUT(1) SHORT THREAD HARDWARE (HI-LITE)(2)				
SCREW		ASNA 2026 ASNA 2027	ASNA 2352T ASNA 2026V ASNA 2027V ASNA 2026T ASNA 2027T	ASNA 2026K ASNA 2027K
NUT		ASNA 2031*/ASNA 2531 ASNA 2032*/ASNA 2532 ASNA 2036*/ASNA 2536(3) ASNA 2038*/ASNA 2538(3)	ASNA 2528(3) ASNA 2529	ASNA 2537(3)
DIA		m.daN (lbf.in.)	m.daN (lbf.in.)	m.daN (lbf.in.)
CODE	mm (in.)			
6-32	3.5 (9/64)			
8-32	4.17 (21/128)			
3	4.82 (3/16)	0.37-0.42-0.48 (33-37.5-42)		
4	6.35 (1/4)	0.63-0.72-0.82 (56-64-72)		0.82-0.94-1.06 (72-83-94)
5	7.92 (5/16)	1.38-1.58-1.79 (122-140-158)		1.79-2.01-2.24 (158-178-198)
6	9.52 (3/8)	2.24-2.46-2.69 (198-218-238)		
7	11.1 (7/16)	3.22-3.54-3.87 (285-313.5-342)		
8	12.7 (1/2)	4.64-5.10-5.57 (410-451.5-493)		
9	14.3 (9/16)	6.69-7.58-8.02 (592-671-710)	5.57-6.13-6.69 (493-542.5-592)	
10	15.9 (5/8)	9.63-10.87-11.50 (852-962-1017)	6.69-7.35-8.02 (592-651-710)	
12	19 (3/4)			

NOTE(1): THESE TORQUE VALUES ARE CORRECT FOR NUTS AND BOLTS WITH INITIAL LUBRICANTS.

NOTE(2): THE TORQUE VALUES ARE GIVEN FOR INSTALLATION WITH NUTS THAT ARE NOT HI-LOCK NUTS.

NOTE(3): DOUBLE HEXAGON HI. LITE NUTS THAT MUST TIGHTENED AGAIN. (INSTALLED ON NON POLYMERIZED SEALANT)

*OBSOLETE, REPLACED BY ASNA 25XX

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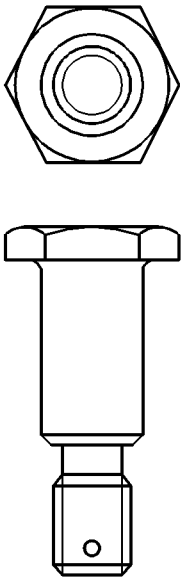
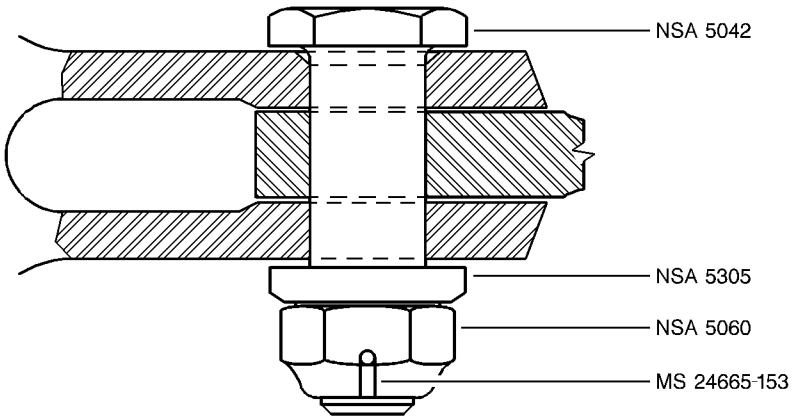
Torque Values for Self Locking Nuts
Figure 005



BOLT	THREAD	MAX-TORQUE		MIN-TORQUE	
	NOMINAL SIZE (in.) UNJF - 3A	m daN	lbf in.	m daN	lbf in.
NSA5042-04	.1900 - 32	1	88	0.1	8.8
NSA5042-05	.2500 - 28	1	88	0.1	8.8
NSA5042-06	.3125 - 24	2	177	0.1	8.8
NSA5042-07	.3125 - 24	2	177	0.1	8.8
NSA5042-08	.3125 - 24	2	177	0.1	8.8
NSA5042-09	.3125 - 24	2	177	0.1	8.8
NSA5042-10	.3750 - 24	3.5	310	0.1	8.8



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Tightening Torques of the Shoulder Bolts
Figure 006

R

component.
- the mechanical attachment of the component to its support.
- the mechanical connection of the various component parts, one with the other.
- the removal and installation of the fasteners for maintenance.

(2)General requirements and precautions.
(a)You must tighten the fasteners with a torque wrench or calibrated screwdriver.
(b)Do not change the original lubrication of the hardware.
(c)To install a nut on a stud or a bolt in a nut.
1 Align the two components axially.
2 Apply a light pressure and turn "to loosen", until you feel a click on the first thread.
3 Turn "to tighten" by two turns.
4 **TORQUE** with the applicable tool.
(d)When you have a stacked assembly with the bolt or the nut in contact with the components, manually make sure that the components are in the correct position before you apply the torque.
(e)Apply the tightening torque in one continuous operation.
NOTE : If you cannot apply the torque in one continuous operation (limited travel or access), do the last tightening operation with a sufficient movement (with a rotation of 30 degrees minimum).
(f)The effectively applied torque must not depend on :
- the speed at which the wrench or the screwdriver is used,
- the position of the wrench or the screwdriver,
- the lateral load that may be applied on the wrench to hold it in place.

(3)Special requirements and precautions.
(a)Connection fasteners.
Use a wiring principle that prevents stress in the cables that can cause loosening of the fasteners.
(b)Attachment fasteners.
When the diameter of the attachment fasteners is less than the diameter of the connection fasteners :
- make sure that you do not cause damage to the attachment of the component on the support when you apply the torque to the connection fasteners.

(c)Fasteners for assembly/locking.
You must not use the nuts and bolts to assemble or mate the components. The fasteners must be used only to finalize the operation.
(d)Electrical connections that are not used.
1 Terminal studs that are not used
Remove the nut and leave the stud free.
2 Others
Tighten the connection screws and nuts to the specified torque values.
(e)Limitation of use.
1 You cannot use the self-locking nuts again.
2 For other types of fasteners, you can use them again in these conditions :
- the threads and mating surfaces are not damaged,

- the protection of the fasteners and the surface condition is not damaged.

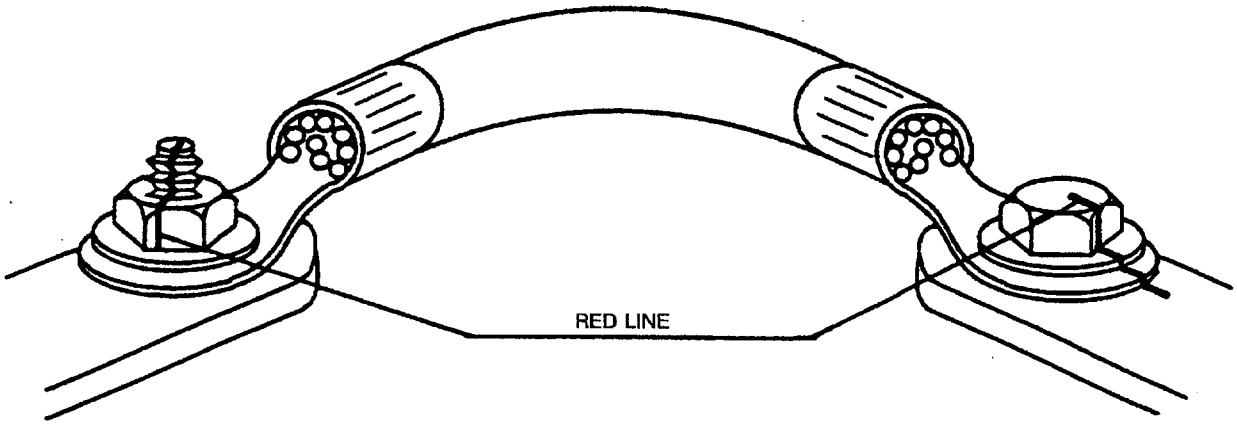
NOTE : If you use the bolts and nuts again, this :
- makes the pre-tension weaker because it decreases the satisfactory effect of the lubricant.
- causes local damage to the protection of the bolts and nuts which can cause corrosion or seizing.
- can cause damage to the mating surfaces.
- can decrease the torque for the self-lcoking nuts.

(4)Visual inspection before application of the tightening torque
(a)Before you apply the tightening torque, make sure that :
1 The old identification mark (ref mark) is removed (if painted).
NOTE : You must not usde the red mark as a visual reference for tightening of the fasteners.
2 The quality of the bolt and nut threads and of the lubrication is correct.
3 The tightening tools agree with the bolts and nuts.
4 The chamfer of the bolt is higher than or equal to the depth of the thread.
5 The terminals are flat and without burrs.

(5)Application of the tightening torque.
(a)Apply the tightening torques to the fasteners.
(Ref. Fig. 008)
(Ref. Fig. 009, 010, 011)
(Ref. Fig. 012, 013, 014)
(Ref. Fig. 015, 016, 017)
(Ref. Fig. 018, 019, 020)
(Ref. Fig. 021, 022, 023)

(6)Visual inspection after application of the torque.
(a)After you apply the torque, make sure that :
1 The position of the assembled components has not changed.
2 The terminals are parallel.
3 The components are correctly locked.
4 You can see at least one thread and a half above the nut.
(b)Apply the identification mark (red mark) if it is necessary.

(7)Marking of screws and nuts (identification mark).
(a)After application of the tightening torque, on electrical connections held by a nut or a screw (except circuit-breakers) and made with cables with a cross-section of 5 mm2 or more (size 10 - 8 - 6 etc), you must make an identification mark (red painted line) between the nut or screw head and a fixed point using LACQUERS (Material No. 07-020). (Ref. Fig. 007).
NOTE : You must not use the red mark as a visual reference for tightening of the screw or the nut.
You must remove this mark before any operation on the connection.
After an operation, you must tighten the screw or the nut to the applicable torque value and repaint the red mark.



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Marking of Screws and Nuts
Figure 007

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
HOLDER FUSE	NSA 931 190	7.94(0.31) OU M8	0.8 (70.80)	1 (88.49)	4.83 (0.19)						
CIRCUIT BREAKER	NSA 931 300	4.17 (0.16)	0.07 (6.19)	0.10 (8.84)	12 (0.47)	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 301	4.17 (0.16)	0.07 (6.19)	0.10 (8.84)	12 (0.47)	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 302	4.17 (0.16)	0.07 (6.19)	0.10 (8.84)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 303	4.17 (0.16)	0.09 (7.96)	0.10 (8.84)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 304		0.09 (7.96)	0.10 (8.84)		0.15 (13.27)	0.17 (15.04)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 320	4.17 (0.16)	0.14 (12.39)	0.16 (14.16)		0.45 (39.82)	0.50 (44.24)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 321	4.17 (0.16)	0.22 (19.47)	0.24 (21.23)		0.525 (46.46)	0.575 (50.88)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 322	4.17 (0.16)	0.12 (10.61)	0.14* (12.39)		0.45 (39.82)	0.50 (44.24)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 323	4.17 (0.16)	0.22 (19.47)	0.24 (21.23)		0.525 (46.46)	0.575 (50.88)				ATTACHMENT WITH THIN NUT
CIRCUIT BREAKER	NSA 931 324	4.17 (0.16)	0.14 (12.39)	0.16* (14.16)		0.45 (39.82)	0.50 (44.24)				ATTACHMENT WITH THIN NUT

* 0.17(15.04) WHEN USING #8 CABLE

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Tightening Torques for Electrical Components
Figure 008

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
SWITCH	NSA 931 401					0.13 (11.50)	0.15 (13.27)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 402	M3	0.049 (4.34)	0.062 (5.48)	M12 x 100	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 403	M3	0.049 (4.34)	0.062 (5.48)	M12 x 100	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 404		0.040 (3.54)	0.045 (3.98)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 406					0.50 (44.25)	0.60 (53.09)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 407		0.09 (7.96)	0.11 (9.73)		0.50 (44.25)	0.60 (53.09)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 408		0.06 (5.31)	0.08 (7.07)		0.19 (16.81)	0.21 (18.58)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 421				M10 x 0.75	0.13 (11.50)	0.15 (13.27)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 422	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 423	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT

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Tightening Torques for Electrical Components
Figure 009

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
SWITCH	NSA 931 424		0.040 (3.54)	0.045 (3.98)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 425		0.040 (3.54)	0.045 (3.98)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 427	M2	0.014 (1.24)	0.018 (1.59)		0.48 (42.48)	0.50 (44.24)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 428	M2	0.014 (1.24)	0.018 (1.59)		0.48 (42.48)	0.50 (44.24)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 429	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 430	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 431	3.50 (0.14)	0.08 (7.08)	0.09 (7.96)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 432				15/32	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 433					0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - TWO - POLE	NSA 931 434		0.07 (6.19)	0.10 (8.84)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - THREE - POLE	NSA 931 441	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - THREE - POLE	NSA 931 442	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - THREE - POLE	NSA 931 443	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - THREE - POLE	NSA 931 444	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - THREE - POLE	NSA 931 445		0.04 (3.54)	0.045 (3.98)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - THREE - POLE	NSA 931 446		0.04 (3.54)	0.045 (3.98)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - FOUR - POLE	NSA 931 461	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT

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Tightening Torques for Electrical Components
Figure 010

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
SWITCH - FOUR - POLE	NSA 931 462	M2	0.014 (1.24)	0.018 (1.59)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - FOUR - POLE	NSA 931 463		0.040 (3.54)	0.045 (3.98)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - FOUR - POLE	NSA 931 464		0.040 (3.54)	0.045 (3.98)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - FOUR - POLE	NSA 931 465	3.50 (0.14)	0.09 (7.96)	0.10 (8.84)	15/32	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - TOGGLE	NSA 931 470					0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
MICROSWITCH	NSA 931 703	M3	NOMINAL 0.05(4.42)			NOMINAL 0.05(4.42)					ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 901	M2	0.03 (2.65)	0.04 (3.53)	M12 x 100	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 902		0.03 (2.65)	0.04 (3.53)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 903		0.03 (2.65)	0.04 (3.53)		0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 904	M2	0.03 (2.65)	0.04 (3.53)	M12 x 100	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH - MINIATURE	NSA 931 905					0.09 (7.96)	0.10 (8.84)				ATTACHMENT WITH THIN NUT
PUSH - BUTTON	NSA 931 906	M2	0.0.3 (2.65)	0.04 (3.53)	M12 x 100	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
PUSH - BUTTON	NSA 931 907	M2	0.03 (2.65)	0.04 (3.53)	M12 x 100	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 911					0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 912					0.01 (0.88)	0.012 (1.06)				ATTACHMENT WITH THIN NUT
PUSH - BUTTON	NSA 931 914				5/8	0.48 (42.48)	0.50 (44.24)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 915	2.84 (0.11)	0.05 (4.42)	0.07 (6.19)		0.95 (84.07)	1 (88.49)				ATTACHMENT WITH THIN NUT

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Tightening Torques for Electrical Components
Figure 011

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
SWITCH	NSA 931 916					0.40 (35.40)	0.45 (39.82)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 917					0.40 (35.40)	0.45 (39.82)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 918					0.40 (35.40)	0.45 (39.82)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 919					0.40 (35.40)	0.45 (39.82)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 920					0.40 (35.40)	0.45 (39.82)				ATTACHMENT WITH THIN NUT
SWITCH	NSA 931 925					0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
MICROCONTACTER	NSA 932 001					0.48 (42.48)	0.50 (44.24)				ATTACHMENT WITH THIN NUT
SWITCH LIMIT	NSA 932 033					0.95 (84.07)	1 (88.49)				ATTACHMENT WITH THIN NUT
SWITCH LIMIT	NSA 932 034				M12 x 100	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH LIMIT	NSA 932 035				25.4 1.00	0.95 (84.07)	1 (88.49)				ATTACHMENT WITH THIN NUT
SWITCH LIMIT	NSA 932 036				15/32	0.19 (16.81)	0.20 (17.69)				ATTACHMENT WITH THIN NUT
SWITCH LIMIT	NSA 932 037					0.16 (14.16)	0.17 (15.04)				ATTACHMENT WITH THIN NUT
KNOB - CONTROL	NSA 932 405					0.07 (6.19)	0.10 (8.84)				
KNOB - CONTROL	NSA 932 406					0.07 (6.19)	0.10 (8.84)				
KNOB - CONTROL	NSA 932 407					0.07 (6.19)	0.10 (8.84)				
KNOB - CONTROL	NSA 932 408					0.07 (6.19)	0.10 (8.84)				
KNOB - CONTROL	NSA 932 409					0.07 (6.19)	0.10 (8.84)				

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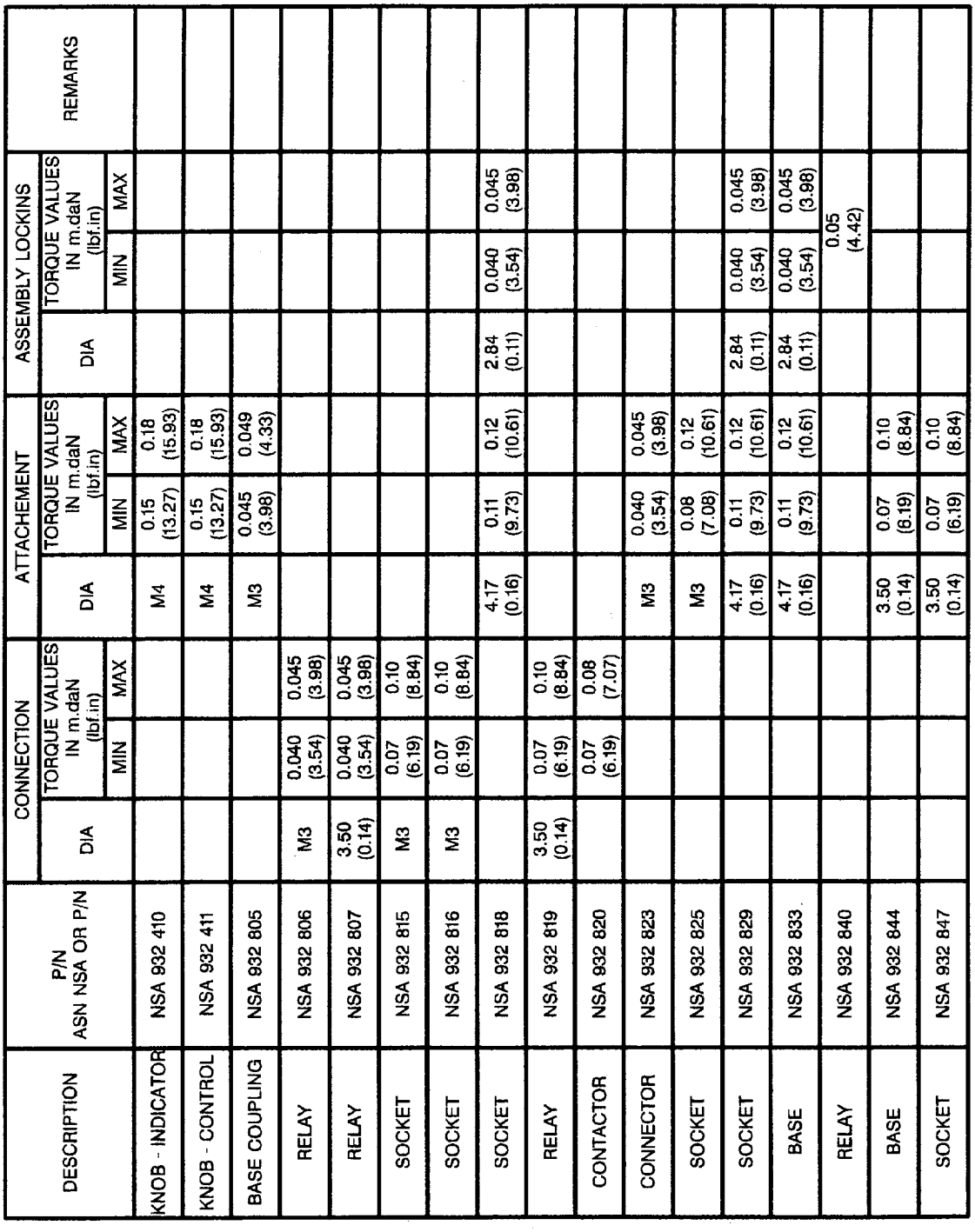
Tightening Torques for Electrical Components
Figure 012



DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
KNOB - INDICATOR	NSA 932 410				M4	0.15 (13.27)	0.18 (15.93)				
KNOB - CONTROL	NSA 932 411				M4	0.15 (13.27)	0.18 (15.93)				
BASE COUPLING	NSA 932 805				M3	0.045 (3.98)	0.049 (4.33)				
RELAY	NSA 932 806	M3	0.040 (3.54)	0.045 (3.98)							
RELAY	NSA 932 807	3.50 (0.14)	0.040 (3.54)	0.045 (3.98)							
SOCKET	NSA 932 815	M3	0.07 (6.19)	0.10 (8.84)							
SOCKET	NSA 932 816	M3	0.07 (6.19)	0.10 (8.84)							
SOCKET	NSA 932 818				4.17 (0.16)	0.11 (9.73)	0.12 (10.61)	2.84 (0.11)	0.040 (3.54)	0.045 (3.98)	
RELAY	NSA 932 819	3.50 (0.14)	0.07 (6.19)	0.10 (8.84)							
CONTACTOR	NSA 932 820		0.07 (6.19)	0.08 (7.07)							
CONNECTOR	NSA 932 823				M3	0.040 (3.54)	0.045 (3.98)				
SOCKET	NSA 932 825				M3	0.08 (7.08)	0.12 (10.61)				
SOCKET	NSA 932 829				4.17 (0.16)	0.11 (9.73)	0.12 (10.61)	2.84 (0.11)	0.040 (3.54)	0.045 (3.98)	
BASE	NSA 932 833				4.17 (0.16)	0.11 (9.73)	0.12 (10.61)	2.84 (0.11)	0.040 (3.54)	0.045 (3.98)	
RELAY	NSA 932 840							0.05 (4.42)			
BASE	NSA 932 844				3.50 (0.14)	0.07 (6.19)	0.10 (8.84)				
SOCKET	NSA 932 847				3.50 (0.14)	0.07 (6.19)	0.10 (8.84)				

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Tightening Torques for Electrical Components
Figure 013

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
RELAY	NSA 932 852								0.05 (4.42)		
CONTACTOR	NSA 933 001	M3	0.09 (7.96)	0.10 (8.84)							
INDICATOR	NSA 933 401					0.008 (0.71)	0.01 (0.88)				
INDICATOR	NSA 933 402					0.008 (0.71)	0.01 (0.88)				
INDICATOR	NSA 933 403					0.014 (1.24)	0.018 (1.59)				
MOUNT	NSA 933 404					0.016 (1.41)	0.020 (1.76)				
INDICATOR	NSA 933 501				15/32	0.19 (16.81)	0.21 (18.58)				ATTACHMENT WITH THIN NUT
LUMINOUS BUTTON	NSA 933 602					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT
LUMINOUS BUTTON	NSA 933 603					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT
LUMINOUS BUTTON	NSA 933 604					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT
LUMINOUS BUTTON	NSA 933 605					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT
LUMINOUS BUTTON	NSA 933 606					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT
LUMINOUS BUTTON	NSA 933 607					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT
LUMINOUS BUTTON	NSA 933 608					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT
LUMINOUS BUTTON	NSA 933 609					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT
INDICATOR LIGHT	NSA 933 610				M15 x 75	0.19 (16.81)	0.21 (18.58)				ATTACHMENT WITH THIN NUT
LAMP	NSA 933 611					0.010 (0.88)	0.015 (1.32)				ATTACHMENT WITH THIN NUT

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Tightening Torques for Electrical Components
Figure 014

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
INDICATOR LIGHT	NSA 933 613					0.6 (53.10)					
INDICATOR LIGHT	NSA 933 622					0.010 (0.88)	0.015 (1.32)				
INDICATOR LIGHT	NSA 933 623					0.010 (0.88)	0.015 (1.32)				
INDICATOR LIGHT	NSA 933 624					0.010 (0.88)	0.015 (1.32)				
INDICATOR LIGHT	NSA 933 625					0.010 (0.88)	0.015 (1.32)				
INDICATOR LIGHT	NSA 933 626					0.010 (0.88)	0.015 (1.32)				
INDICATOR LIGHT	NSA 933 627					0.010 (.088)	0.015 (1.32)				
INDICATOR LIGHT	NSA 933 628					0.010 (0.88)	0.015 (1.32)				
INDICATOR LIGHT	NSA 933 629					0.010 (0.88)	0.015 (1.32)				
POTENTIOMETER	NSA 933 950					0.20 (17.70)	0.25 (22.12)				
POTENTIOMETER	NSA 933 951					0.20 (17.70)	0.25 (22.12)				
DIODE - ZENER	NSA 934 102				4.83 (0.19)	0.10 (8.85)	0.15 (13.27)				
DIODE - AVALANCHE	NSA 934 105				4.83 (0.19)	0.10 (8.85)	0.15 (13.27)				
MOUNT DIODE	NSA 934 121								0.05 (4.42)		
CONNECTOR - BULKHEAD	NSA 934 501				M50 x 150	3.2 (283.18)	3.9 (345.13)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 502				M67 x 150	3.6 (318.58)	4.4 (389.38)				ATTACHMENT WITH THIN NUT

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Tightening Torques for Electrical Components
Figure 015

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
CONNECTOR - BULKHEAD	NSA 934 700				1/2	0.33 (29.20)	0.34 (30.08)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				5/8	0.38 (33.63)	0.44 (38.93)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				3/4	0.85 (75.22)	0.93 (82.30)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				7/8	0.90 (79.65)	1.01 (89.39)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				1	0.96 (84.95)	1.07 (94.69)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				1 1/16	1.04 (92.03)	1.15 (101.76)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				1 3/16	1.11 (98.23)	1.22 (107.96)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				1 5/16	1.17 (103.54)	1.29 (114.15)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				1 7/16	1.23 (108.85)	1.37 (121.23)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				1 3/4	1.40 (123.89)	1.50 (132.74)				ATTACHMENT WITH THIN NUT
CONNECTOR - BULKHEAD	NSA 934 700				1 7/8	1.56 (138.05)	1.73 (153.09)				ATTACHMENT WITH THIN NUT

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Tightening Torques for Electrical Components
Figure 016

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
CLAMP	NSA 934 901-01				4.17 (0.16)	0.090 (7.96)	0.140 (12.39)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-02				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-03				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-04				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-05				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-06				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-07				4.17 (0.16)	0.090 (7.96)	0.140 (12.39)	4.83 (0.19)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-08				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	3.50 (0.14)	0.033 (2.92)	0.056 (4.95)	ADJUSTING SCREW
CLAMP	NSA 934 901-09				4.17 (0.16)	0.090 (7.96)	0.140 (12.39)	4.83 (0.19)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-10				3.50 (0.14)	0.056 (4.95)	0.070 (6.19)	3.50 (0.14)	0.056 (4.95)	0.070 (6.19)	ADJUSTING SCREW
CLAMP	NSA 934 901-11				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-12				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 901-13				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 902-01				4.82 (0.19)	0.056 (4.95)	0.090 (7.96)	4.83 (0.19)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 902-02				3.50 (0.14)	0.060 (5.31)	0.090 (7.96)	4.17 (0.16)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 902-03				4.17 (0.16)	0.090 (7.96)	0.140 (12.39)	4.83 (0.19)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW
CLAMP	NSA 934 902-04				4.82 (0.19)	0.056 (4.95)	0.090 (7.96)	4.83 (0.19)	0.056 (4.95)	0.090 (7.96)	ADJUSTING SCREW

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Tightening Torques for Electrical Components
Figure 017

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
DISCHARGER	NSA 936 201										
BASE	NSA 936 222										
MODULE - TERMINAL	NSA 937 901	4.83 (0.19)	0.35 (30.97)	0.45 (39.82)				3.50 (0.14)	COVER SCREW 0.08 (7.08)	0.10 (8.84)	
MODULE - TERMINAL	NSA 937 901								COVER SCREW 0.07 (6.19)	0.10 (8.84)	
BLOCK - TERMINAL	NSA 937 903	3.50 (0.14)	0.14 (12.39)	0.18 (14.15)	3.50 (0.14)	SPACER 0.14 (12.39)	0.16 (14.15)	3.50 (0.14)	COVER SCREW 0.08 (7.08)	0.10 (8.84)	
BLOCK - TERMINAL	NSA 937 904	9.52 (0.37)	2 (177.00)	2.2 (194.69)	4.83 (0.19)	SPACER 0.25 (22.12)	0.30 (26.54)	3.50 (0.14)	COVER SCREW 0.08 (7.08)	0.10 (8.84)	
BLOCK - TERMINAL	NSA 937 905	4.83 (0.19)	0.41 (36.28)	0.45 (39.82)	4.83 (0.19)	SPACER 0.25 (22.12)	0.30 (26.54)	3.50 (0.14)	COVER SCREW 0.08 (7.08)	0.10 (8.84)	
BLOCK - TERMINAL	NSA 937 906	4.83 (0.19)	0.41 (36.28)	0.45 (39.82)	4.83 (0.19)	SPACER 0.25 (22.12)	0.30 (26.54)	3.50 (0.14)	COVER SCREW 0.08 (7.08)	0.10 (8.84)	
GROUND		4.17 (0.16)	0.25 (22.13)	0.27 (23.90)							
		4.83 (0.19)	0.41 (36.28)	0.45 (39.82)							
		6.35 (0.25)	0.62 (54.87)	0.68 (60.19)							
		9.52 (0.37)	2.4 (212.42)	2.7 (238.97)							

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R Tightening Torques for Electrical Components
Figure 018

EFFECTIVITY: ALL

PIA

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
RECEPTACLE	NSA 938 106							9/16	0.33 (29.20)	0.34 (30.08)	
RECEPTACLE	NSA 938 106							11/16	0.38 (33.63)	0.44 (38.93)	
RECEPTACLE	NSA 938 106							7/8	0.85 (75.22)	0.93 (82.30)	
RECEPTACLE	NSA 938 106							15/16	0.90 (79.65)	1.01 (89.38)	
RECEPTACLE	NSA 938 106							1 1/16	0.96 (84.95)	1.07 (94.69)	
RECEPTACLE	NSA 938 106							1 3/16	1.04 (92.03)	1.15 (101.76)	
RECEPTACLE	NSA 938 106							1 5/16	1.11 (98.23)	1.22 (107.96)	
RECEPTACLE	NSA 938 106							1 7/16	1.17 (103.54)	1.29 (114.16)	
RECEPTACLE	NSA 938 106								1.23 (108.85)	1.37 (121.23)	
CONNECTOR BNC	NSA 938 601					0.17 (15.04)	0.23 (20.35)		0.35 (30.97)	0.45 (39.82)	
CONNECTOR TNC	NSA 938 621		0.08* (7.08)	0.10* (8.84)		0.17 (15.04)	0.23 (20.35)		0.35 (30.97)	0.45 (39.82)	* LOCKING
CONNECTOR N	NSA 938 641		0.01* (0.88)	0.012* (1.06)		0.17 (15.04)	0.23 (20.35)				* LOCKING
CONNECTOR C	NSA 938 661					0.17 (15.04)	0.23 (20.35)				
JACK - PLUG	NSA 938 906					0.35 (30.97)	0.50 (44.24)				
RECEPTACLE	NSA 938 910	9.52 (0.37)	0.86 (76.10)	0.95 (84.07)					SHAFT-FASTENING		
		4.83 (0.19)	0.21 (18.58)	0.24 (21.23)				4.83 (0.19)	0.45 (39.82)	0.50 (44.24)	

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Tightening Torques for Electrical Components
Figure 019

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DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
MIL - C - 26500 CONNECTOR	NSA 938 110							5625 (221.62)	0.33 (29.20)	0.34 (30.08)	
MIL - C - 26500 CONNECTOR	NSA 938 110							6875 (270.87)	0.38 (33.63)	0.44 (38.93)	
MIL - C - 26500 CONNECTOR	NSA 938 110							8750 (344.75)	0.61 (53.98)	0.67 (59.29)	
MIL - C - 26500 CONNECTOR	NSA 938 110							9375 (369.37)	0.70 (61.95)	0.78 (69.02)	
MIL - C - 26500 CONNECTOR	NSA 938 110							10625 (418.62)	0.74 (65.49)	0.82 (72.56)	
MIL - C - 26500 CONNECTOR	NSA 938 110							11875 (467.87)	0.88 (77.88)	0.96 (84.95)	
MIL - C - 26500 CONNECTOR	NSA 938 110							13125 (517.12)	1.11 (98.23)	1.22 (107.96)	
MIL - C - 26500 CONNECTOR	NSA 938 110							14375 (566.37)	1.33 (117.70)	1.47 (130.08)	
MIL - C - 26500 CONNECTOR	NSA 938 110							15625 (615.62)	1.56 (138.05)	1.73 (153.09)	
CONNECTOR -BATERRY	NSA 938 915	8 (59)	1 (88.49)	1.2 (106.19)							
RELAY	E 0055										
RELAY	E 0058										
SWITCH	E 0061										
RELAY	E 0065										
RELAY	E 0066										
RELAY	E 0067										
CONNECTOR	E 0354	M3	0.055 (4.86)								
		M4	0.10 (8.84)								

Tightening Torques for Electrical Components
Figure 020

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in) MIN	TORQUE VALUES IN m.daN (lbf.in) MAX	DIA	TORQUE VALUES IN m.daN (lbf.in) MIN	TORQUE VALUES IN m.daN (lbf.in) MAX	DIA	TORQUE VALUES IN m.daN (lbf.in) MIN	TORQUE VALUES IN m.daN (lbf.in) MAX	
CONTACTOR	100CC01A	M5	0.25 (22.12)	0.30 (26.54)							
CONTACTOR	100CC01A	M3	0.049 (4.33)	0.062 (5.48)							
CONTACTOR	101CC01A	M5	0.25 (22.12)	0.30 (26.54)							
CONTACTOR	101CC01A	M3	0.049 (4.33)	0.062 (5.48)							
CONTACTOR	111CC01A	M5	0.25 (22.12)	0.30 (26.54)							
CONTACTOR	111CC01A	M3	0.049 (4.33)	0.062 (5.48)							
CONTACTOR	131CC01A	M8	0.70 (61.95)	0.85 (75.22)							
CONTACTOR	131CC01A	M3	0.049 (4.33)	0.062 (5.48)							
TRANSFORMER	13600		0.30 (26.55)	0.40 (35.39)					0.30 (26.55)	0.40 (35.39)	COVER
GROUND			0.20 (17.70)	0.30 (26.54)							
TRANSFORMER	13601		0.30 (26.55)	0.40 (35.39)					0.30 (26.55)	0.40 (35.39)	COVER
GROUND			0.20 (17.70)	0.30 (26.54)							
CONTACTOR	152CA01C1Y1	M4	0.12 (10.62)	0.15 (13.27)							
CONTACTOR	252CA01C1	M5	0.25 (22.12)	0.30 (26.54)							
CONTACTOR	25811B0	M3	0.049 (4.33)	0.052 (4.60)							
CONTACTOR	25811B0	M4	0.12 (10.62)	0.15 (13.27)							
CONTACTOR	25811B0	M5	0.25 (22.12)	0.30 (26.54)							

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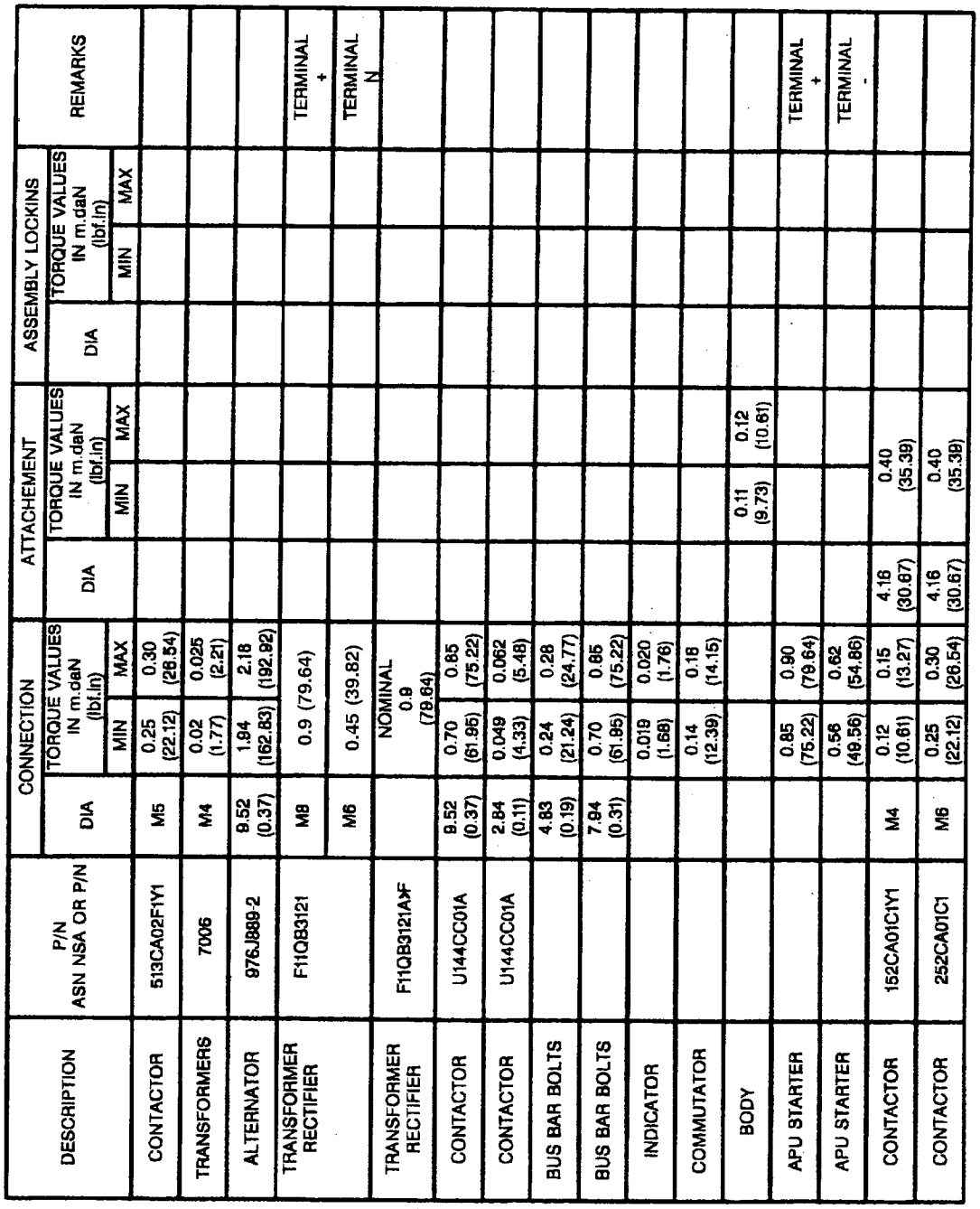
Tightening Torques for Electrical Components
Figure 021

BM5 20 21 12 0 BJM0 02

DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION			ATTACHEMENT			ASSEMBLY LOCKINS			REMARKS
		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		DIA	TORQUE VALUES IN m.daN (lbf.in)		
			MIN	MAX		MIN	MAX		MIN	MAX	
SHUNT	2995-250	4.17 (0.16)	0.015 (1.33)	0.02 (1.76)		0.45 (39.82)	0.50 (44.24)				BASE SCREW
SHUNT	2995-250	7.94 (0.31)	0.60 (53.10)	0.70 (61.94)							
ENLIGHTENED LABELS	30015-00100					0.02 (1.77)	0.03 (2.65)				
COMMUTATOR	3041181		0.14 (12.39)	0.16 (14.15)		0.40 (35.40)	0.60 (53.09)				
PITOT	33615		0.15 (13.27)	0.163 (14.42)							
PITOT	33615-01		0.15 (13.27)	0.163 (14.42)							
CONVERTER	35-454-100	M6	0.50 (44.25)	0.60 (53.09)							
CONTACTOR	3551-2Y2	M10	1.15 (101.77)	1.50 (132.74)							
CONTACTOR REVERSER	3655-1	M10	1.15 (101.77)	1.50 (132.74)							
WIPERS - ENGINE	4020761		0.14 (12.39)	0.16 (14.15)							
INTER - BOX	402TS02Y		0.049 (4.33)	0.062 (5.48)		0.12 (10.62)	0.15 (13.27)				
FIREBREAK PULL HANDLE	4065914					0.04 (3.54)	0.05 (4.42)				
WIPERS - ENGINE	4088414		0.14 (12.39)	0.16 (14.15)							
CONTACTOR	477CA01C15-02Y3	M8	0.9 (79.65)	1 (88.49)							
CONTACTOR	477CA01C15Y1	M8	0.70 (61.95)	0.85 (75.22)							
CONTACTOR	503CA02F1Y1	M4	0.12 (10.62)	0.15 (13.27)							
CONTACTOR	513CA01C1-02Y1		0.25 (22.12)	0.30 (26.54)							
CONTACTOR	25811B05 HUNTKL		0.26 (23.00)	0.29 (25.66)							
CONTACTOR	253CA01F1-02Y1		0.25 (22.12)	0.30 (26.54)							

Tightening Torques for Electrical Components
Figure 022

R



DESCRIPTION	P/N ASN NSA OR P/N	CONNECTION DIA	CONNECTION TORQUE VALUES IN m.daN (lbf.in) MIN	CONNECTION TORQUE VALUES IN m.daN (lbf.in) MAX	ATTACHEMENT DIA	ATTACHEMENT TORQUE VALUES IN m.daN (lbf.in) MIN	ATTACHEMENT TORQUE VALUES IN m.daN (lbf.in) MAX	ASSEMBLY LOCKINS DIA	ASSEMBLY LOCKINS TORQUE VALUES IN m.daN (lbf.in) MIN	ASSEMBLY LOCKINS TORQUE VALUES IN m.daN (lbf.in) MAX	REMARKS
CONTACTOR	513CA02F1Y1	M5	0.25 (22.12)	0.30 (26.54)							
TRANSFORMERS	7006	M4	0.02 (1.77)	0.025 (2.21)							
ALTERNATOR	976J889-2	9.52 (0.37)	1.94 (162.83)	2.18 (192.92)							
TRANSFORMER RECTIFIER	F11QB3121	M8	0.9 (79.64)								TERMINAL +
		M6	0.45 (39.82)								TERMINAL N
TRANSFORMER RECTIFIER	F11QB3121AXF		NOMINAL 0.9 (79.64)								
CONTACTOR	U144CC01A	9.52 (0.37)	0.70 (61.95)	0.85 (75.22)							
CONTACTOR	U144CC01A	2.84 (0.11)	0.049 (4.33)	0.062 (5.48)							
BUS BAR BOLTS		4.83 (0.19)	0.24 (21.24)	0.28 (24.77)							
BUS BAR BOLTS		7.94 (0.31)	0.70 (61.95)	0.85 (75.22)							
INDICATOR			0.019 (1.68)	0.020 (1.76)							
COMMUTATOR			0.14 (12.39)	0.18 (14.15)							
BODY						0.11 (9.73)	0.12 (10.61)				
APU STARTER			0.85 (75.22)	0.90 (79.64)							TERMINAL +
APU STARTER			0.56 (49.56)	0.62 (54.86)							TERMINAL -
CONTACTOR	152CA01C1Y1	M4	0.12 (10.61)	0.15 (13.27)	4.16 (30.67)		0.40 (35.39)				
CONTACTOR	252CA01C1	M6	0.25 (22.12)	0.30 (26.54)	4.16 (30.67)		0.40 (35.39)				

Tightening Torques for Electrical Components
Figure 023

REJECTION CRITERIA

1. General

During maintenance operations, bolts and nuts evidencing the following damage shall be rejected :

- cracks, fractures, folds,
- protective finish deterioration and corrosion,
- distortion (stretching and brinelling),
- stripped threads,
- worn threads.

NOTE : Damage resulting from overtorquing and thread wear is readily detected by means of a thread form-gage.

R

1. General

R

The bolt/shaft is installed in accordance with the relevant maintenance procedure.

A groove in the outer face of a Sta-lok nut indicates a left-hand thread.

You must discard and replace lockwashers that have a missing or bent tab.

Sealing requirements detailed in maintenance procedure are mandatory.

2. Installation and Removal

A. Equipment and Materials

ITEM	DESIGNATION
A.	Wrench Tools (Ref.Table 2)
B.	Installation Tools (Ref.Tables 3 and 4)
C.	Removal Tools (Ref.Tables 3 and 4)
D.	Torque Wrench
E. Material No. 04-004	Synthetic Grease (Ref. 20-31-00)

B. Procedure

(Ref. Fig. 001)
(Ref. Fig. 002)
(Ref. Fig. 003)

(1)Job Set-Up

(a)Make sure that the work package contains a Sta-lok nut, lockwasher and the applicable tools.

(b)Before installation of the Sta-lok nut, make sure that the bolt/shaft protrusion exceeds the minimum length (Ref. Table 1).

(c)Apply synthetic grease (Material No. 04-004) to the bolt/shaft thread, to allow torque tightening.

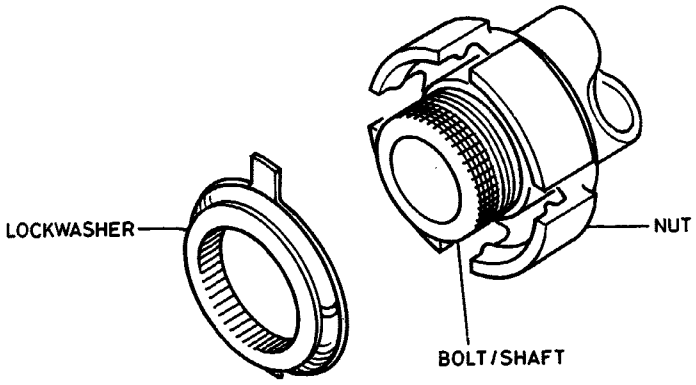
(2)Installation

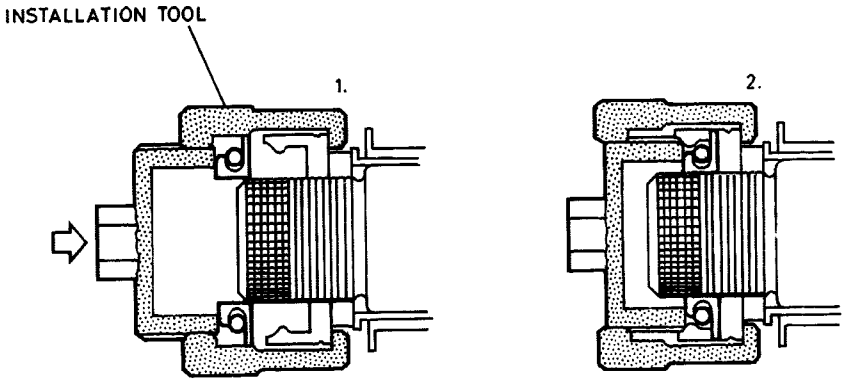
(a)Install the Sta-lok nut onto the bolt/shaft.

NOTE : When called for, apply jointing compound to the mating face of the Sta-lok nut. The jointing compound Material No. and its application is detailed in the maintenance procedure.

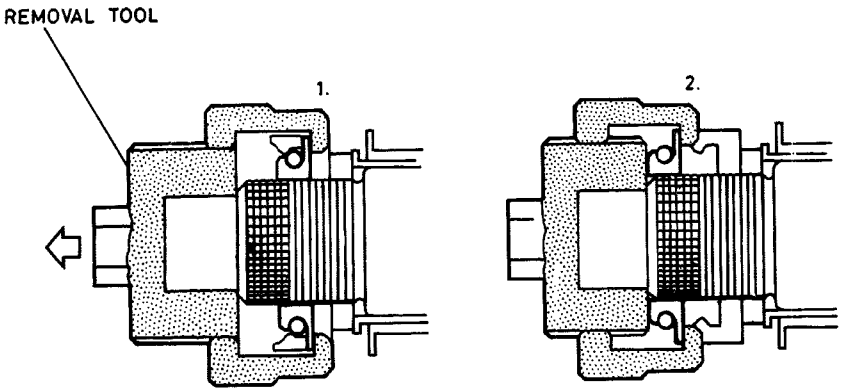
(b)Use the correct wrench tool and torque value (Ref. Table 2) to torque tighten the Sta-lok nut.

NOTE : If the torque values in Table 2 differ from those in the maintenance procedure, the latter are to be used.





INSTALLING LOCKWASHER USING INSTALLATION TOOL



REMOVING LOCKWASHER USING REMOVAL TOOL

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Sta-lok Nuts and Washers.
Figure 001

NSA5454 SIZE REF.	THREAD SIZE	MINIMUM PROTRUSION mm(in)
6/6C	0.3750-32UNJEF	8.69 (0.342)
7	0.4375-28UNJEF	8.71 (0.343)
8/8A/8B	0.5000-28UNJEF	9.49 (0.374)
9/9B	0.5625-24UNJEF	10.00 (0.394)
10	0.6250-24UNJEF	9.97 (0.393)
12	0.7500-20UNJEF	10.74 (0.423)
14	0.8750-20UNJEF	11.14 (0.439)
16	1.0000-16UNJEF	11.93 (0.470)
18	1.1250-16UNJEF	11.99 (0.472)
20	1.2500-16UNJEF	13.38 (0.527)

Bolt/Shaft Minimum Protrusion
Table 1

NSA5454 SIZE REF.	THREAD SIZE	TORQUE VALUES m.daN(lbf.ft)	WRENCH TOOL No.
6/6C	0.3750-32UNJEF	1.36-2.71 (10-20)	SL90.315-0.3750
7	0.4375-28UNJEF	1.60-3.00 (12-22)	SL90.315-0.4375 OR SL90.322-0.4375 OR SL90.374-0.4375
8	0.5000-28UNJEF	2.03-3.39 (15-25)	SL90.374-0.5000
8A	0.5000-28UNJEF	2.03-3.39 (15-25)	SL90.315-0.5000
8B	0.5000-28UNJEF	2.03-3.39 (15-25)	SL90.321-0.5000
9/9B	0.5625-24UNJEF	2.58-3.93 (19-29)	SL90.322-0.5625
10	0.6250-24UNJEF	3.12-4.61 (23-34)	SL90.374-0.6250 OR SL90.437-0.6250
12	0.7500-20UNJEF	4.75-6.51 (35-48)	SL90.374-0.7500
14	0.8750-20UNJEF	7.46-9.36 (55-69)	SL90.374-0.8750
16	1.0000-16UNJEF	10.60-12.90(78-95)	SL90.315-1.0000
18	1.1250-16UNJEF	14.20-17.20(105-127)	SL90.303-1.1250
20	1.2500-16UNJEF	18.30-21.96(135-162)	SL90.374-1.2500

Wrench Tools and Torque Values
Table 2

BM5 20 21 16 0 ACM0 00

Data Tables - Installation of Sta-lok Nuts NSA5454
R Figure 002

NSA5454 SIZE REF.	THREAD SIZE	INSTALLATION TOOL	REMOVAL TOOL
6/6C	0.3750-32UNJEF	SL90.359 - 0.3750	SL90.314 - 0.3750
7	0.4375-28UNJEF	SL90.313 - 0.4375	SL90.314 - 0.4375
		OR SL90.349 - 0.4375	OR SL90.350 - 0.4375
8	0.5000-28UNJEF	SL90.313 - 0.5000	SL90.314 - 0.5000
8A	0.5000-28UNJEF	SL90.349 - 0.5000	SL90.350 - 0.5000
8B	0.5000-28UNJEF	SL90.313 - 0.5000	SL90.314 - 0.5000
9B	0.5625-24UNJEF	SL90.313 - 0.5625	SL90.314 - 0.5625
10	0.6250-24UNJEF	SL90.487 - 0.6250	SL90.314 - 0.6250
		OR SL90.313 - 0.6250	OR SL90.350 - 0.6250
12	0.7500-20UNJEF	SL90.313 - 0.7500	SL90.314 - 0.7500
14	0.8750-20UNJEF	SL90.313 - 0.8750	SL90.314 - 0.8750
16	1.0000-16UNJEF	SL90.313 - 1.0000	SL90.314 - 1.0000
18	1.1250-16UNJEF	SL90.309 - 1.1250	SL90.310 - 1.1250
20	1.2500-16UNJEF	SL90.313 - 1.2500	SL90.314 - 1.2500

Lockwasher Installation and Removal Tools
Table 3

NSA5454 SIZE REF.	THREAD SIZE	INSTALLATION TOOL	REMOVAL TOOL
12	0.7500-20UNJEF	SL90.309 - 0.7500	SL90.310 - 0.7500
18	1.1250-16UNJEF	SL90.309 - 1.1250	SL90.310 - 1.1250

Lockwasher Installation and Removal Tools
- Special Case (Restricted Space Over Nut)
Table 4

BM5 20 21 16 0 AEM0 00

R

Lockwasher Removal/Installation Tools
Figure 003

(c)Slide the lockwasher, anti-rotation tangs leading, onto the serrated threads of the bolt/shaft, locate the tangs into the two slots in the STA-lok nut.
(d)Select the correct installation tool for the lockwasher (Ref. Table 3).
(e)Adjust the tool so that the core inner end is level with the outer-body inner face.

(f)Put the installation tool over the bolt/shaft end and the Sta-lok nut that the tool lugs pass through the vacant nut slots and clear the major body diameter.

NOTE : If the space above the nut is restricted, use the special tool (Ref. Table 4), by screwing down the tool core to permit the location on the nut, then rotating the core out again until the lugs clear the nut major body diameter.

(g)Turn the installation tool counter-clockwise (approximately 45 deg) until the Sta-lok nut slot shows in the tool slot.
(h)Hold the tool, initially to prevent it from rotating, and use a wrench to rotate the core and close the tool, engaging the lockwasher circlip in the groove of the Sta-lok nut recess.

NOTE : At full engagement a 'click' will be felt and the wrench load will increase sharply.

(j)Turn back the core of the installation tool until the tool lugs clear the major body diameter of the Sta-lok nuts.
(k)Turn the installation tool clockwise until its lugs come into the vacant Sta-lok nut slots and withdraw the tool.

(3)Removal
(a)Select the correct lockwasher removal tool (Ref. Table 3).
(b)Adjust the tool so that the core inner end is level with the outer-body inner face.
(c)Put the removal tool over the assembled bolt/shaft end, Sta-lok nut and lockwasher so that the tool lugs pass through the vacant nut slots and clear the major body diameter of the Sta-lok nuts.

NOTE : If the space above the nut is restricted, use the special tool (Ref. Table 4), by screwing down the tool core to permit the location on the nut, then rotating the core out again until the lugs clear the major body diameter of the nuts.

(d)Rotate the removal tool until the tool lugs align with the anti-rotation tangs. Pull the tool to engage the tool slots behind the lockwasher anti-rotation tangs.
(e)Rotate the removal tool core, with a wrench, to close the tool and pull the lockwasher clear of the Sta-lok nut.
(f)Detach the removal tool and the lockwasher.
(g)Refer to Table 2 and select the correct wrench tool.
(h)Offer up the wrench tool to the installed Sta-lok nut. Remove the nut using a wrench.

LOCK PLATES

1. General

To secure a lock plate, the tabs should be bent in opposite direction.

One tab alone is not sufficient to secure or lock.

Flap surface or specific grooves have to receive the bent tabs.

GREASE NIPPLES

R 1. Repair
Repair damaged grease nipple adapters, according to SRM 57-00-00, P. Block 701.

LINES

1. General

This section deals with the installation of rigid lines on the aircraft together with the torque values applied to the various unions used for assembling these lines.

A. Hydraulic Lines

The following table gives the thicknesses of hydraulic lines, as a function or diameters and materials used.

Nominal Diameter (in.)	Thickness			
	Stainless Steel 21.6.9.		Light Alloy 6061.T6.	
	in.	mm	in.	mm
1/4	0.016	0.41	0.035	0.89
5/16	0.020	0.51	0.035	0.89
3/8	0.020	0.51	0.035	0.89
1/2	0.026	0.66	0.035	0.89
5/8	0.033	0.84	0.035	0.89
3/4	0.039	0.99	0.035	0.89
1	0.052	1.32	0.048	1.22
1 1/2	0.024	0.61	0.035	0.89

INSTALLATION AND REPAIR OF TUBING

1. General

This topic deals with installation and repair of tubing on aircraft and precautions to be observed during installation.
Tubing must be carefully handled so as to prevent dents, distortion and scratches.

CAUTION : WHENEVER CARGO COMPARTMENT DOORS REMAIN OPEN DURING MAINTENANCE ON YELLOW HYDRAULIC SYSTEM (DISCONNECTION OF HYDRAULIC LINES OR REPLACEMENT OF HYDRAULIC COMPONENTS), MAKE CERTAIN THAT CARGO DOOR ACTUATOR IS FILLED WITH HYDRAULIC FLUID. IF NOT, BLEED ACTUATOR AND PRESSURIZE LINES PRIOR TO CLOSING DOOR (REF. 52-33-00, P. Block 301).

CAUTION : WHENEVER WORKING SIMULTANEOUSLY ON SEVERAL HYDRAULIC SYSTEMS, ALWAYS ENSURE THAT THE TUBES ARE CLEARLY IDENTIFIED AND MARKED BEFORE CUTTING AND/OR REMOVAL.

A. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedure	
- 52-33-00, P. Block 301	Cargo Compartment Door Hydraulic System

2. Installation of Tubing

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Emery Cloth - Grade No. 320
(2)Material No. 04-004	Common Greases (Ref. 20-31-00)
(3)Material No. 04-012	Common Greases (Ref. 20-31-00)
(4)	Teflon Tape
(5)Material No. 02-003	Hydraulic Fluids (Ref. 20-31-00)
Referenced Procedures	
- 20-23-12, P. Block 1	Specified Torque Values For Unions
- 20-28-11, P. Block 1	Electrical Bonding
- 29-00-00, P. Block 401	General

B. Procedure

(1)Job set-up
- (a)Make certain that all hydraulic systems are depressurized.
- (b)Remove line support blocks.
- (c)Using Grade No.320 Emery Cloth, remove protective coating so as to bare structure at spot where line support blocks are to be installed and smear with Material No.04-012.
- (d)Make certain that line support blocks are perfectly clean. Install line support blocks.
- (e)Make certain that line clamp rubber linings are in sound condition and correctly located in clamp.

(2)Installation of tubing on aircraft

NOTE : Threads on hydraulic line fittings must be smeared with Material No.02-003 and seals dipped into same material prior to installation.
Air duct O-rings must be smeared with Material No.04-004 during installation.

(a)Re-installation of a tube

1 Make certain that fitting threads are in correct condition and that lines have been flushed through.

NOTE : For flared tubing, check that flared ends are in correct condition.
Do not install tubes whose flared ends bear evidence of cracks, pitting, etc. However, tubes bearing marks of previously installed sleeves may be installed.

CAUTION : ANY MARK EXCEEDING 0.05 mm (0.002 in.) IN DEPTH IS AN INDICATION THAT EITHER THE SPECIFIED TORQUE VALUE HAS BEEN EXCEEDED DURING TIGHTENING OF FITTING OR THAT FITTING HAS BEEN TORQUED AND SLACKENED A GREAT NUMBER OF TIMES. IN SUCH CASE THE TUBE MUST BE DISCARDED.

2 Make certain that electrical bonding is correct (Ref. 20-28-11, P. Block 1).

3 TORQUE the connections to the applicable values (Ref. 20-23-12, P. Block 1).

(b)Installation of replacement tube

CAUTION : A TUBE OR FITTING MUST NEVER BE FORCED INTO POSITION TO LINE UP UNDER INITIAL STRESS.
TUBE MUST FIT SNUGLY AND SQUARELY BEFORE STARTING TO TIGHTEN UNION NUT. IF TUBE IS FOUND TO BE TOO SHORT DURING INSTALLATION, IT MUST BE DISCARDED.

1 Remove protective caps from lines.

2 Make certain that reference markings are visible and are not located close to a partition or close to a line support block or line clamp.

3 Make certain that tubes can easily be installed in line support blocks without forcing the tube into position and that line-up with fittings is correct.

NOTE : In the event that the tube is too close to a corner, or a nut, despite all precautions taken, tube must be protected with Teflon tape.

4 Make certain that electrical bonding is correct (Ref. 20-28-11, P. Block 1).

5 TORQUE the connections to the applicable values (Ref. 20-23-12, P. Block 1).

(3)Inspection after installation of a tubing

(a)Do the applicable bleeding procedure (Ref. 29-00-00, P. Block 401).

(b)Pressurize the aircraft hydraulic system to nominal pressure and do a check for leaks.

3. Tightening Practices for Hydraulic Connections

A. Equipment and Materials

ITEM	DESIGNATION
(1)Material No. 02-003	Hydraulic Fluids (Ref. 20-31-00)
(2)Material No. 04-015	Common Greases
(3)98F29003000000	Standard Torque Tool Set
Referenced Procedures	
- 20-23-12, P. Block 1	Specified Torque Values for Unions
- 20-23-16, P. Block 1	Installation of the O-Ring Seal
- 20-23-22, P. Block 1	Marking of Tightened Unions
- 29-00-00, P. Block 401	General

B. Job Set-up

(1)Visual inspection before assembly

(a)Make sure that the parts you assemble are clean and free of contamination.

(b)Make sure that the parts you assemble are not damaged. Specially, inspect the sealing surfaces (on fittings and pipe ends) and the threads of the fittings.

NOTE : Reject any part that shows signs of damage (scratches, nicks, deformation...).

C. Procedure

(1)Lubrication (Ref. Fig. 001)

CAUTION : ONLY USE THE SPECIFIED LUBRICANT TO LUBRICATE THE FITTING THREADS AND THE SHOULDER OF THE SLEEVE.

CAUTION : ONLY USE HYDRAULIC FLUID MATERIAL NO. 02-003 TO LUBRICATE THE O-RING AND THE THREAD (O-RING SIDE) ON PLUG-IN FITTINGS. OTHER LUBRICANTS CAN CAUSE DAMAGE TO THE O-RING.

(a)Lightly lubricate with HYDRAULIC FLUIDS (Material No. 02-003) or COMMON GREASE (Material No. 04-015):

- the thread on the male fitting
- the shoulder of the sleeve (when possible).

NOTE : Lubricate the thread on the male fitting to get the highest possible load on the contact surfaces.

NOTE : Do not apply lubricant on the female thread (unless it is on the housing side of a plug-in union connection, because the lubricant on the male thread can extrude the o-ring during assembly).

Do not apply lubricant on the contact surfaces between the sleeve and the sealing surface of the fitting. Lubricant can cause the pipe to turn when you torque the sleeve nut.

(b)Remove excess lubricant with a clean, dry lint-free cloth.

(2)Assembly

NOTE : Connection on straight plug-in fittings or bulkhead fittings:

- Straight plug-in fittings

You must install and torque the straight plug-in fitting to the applicable torque value before you connect the pipe

(Ref. 20-23-16, P. Block 1).
- Straight bulkhead fittings
  You must install the straight bulkhead fitting and torque the locknut to the applicable value before you connect the pipe.
- Swivel bulkhead fittings
  You must connect and torque to the applicable value the pipe sleeve nuts (at each end of the fitting) before you torque the locknut of the swivel bulkhead fitting to the applicable value.

(a)Position the pipe and make sure that:
- the pipe you install is not too short or too long
- the pipe you install can be positioned without too much force on the clamp blocks
- the pipe alignment at unions is correct.

NOTE : The force necessary to correct the alignment must not be more than light finger pressure (1 daN (2.2480 lbf)).

(b)Align the pipe and the fitting and insert tube end. The sleeve must be fully bottomed against the mating surface of the fitting.

(c)Tighten the sleeve nut with your hand until it bottoms against the sleeve shoulder.

NOTE : The nut must turn freely on the thread. This shows that the tube ends are correctly aligned.

NOTE : You must connect and tighten with your hand all the ends of the pipe before you apply the tightening torque on one end.

NOTE : When you install a pipe on a tee or a cross, you must connect and tighten with your hand all the connections of the tee or the cross before you apply the tightening torque on one end.

NOTE : When you connect a flexible hose, make sure that you do not twist the hose during the assembly.

(d)Attach the clamp blocks without tightening.

(3)Tightening torque application

CAUTION : WHEN YOU TORQUE THE NUT, ALWAYS USE A SECOND WRENCH TO APPLY A COUNTERTORQUE TO THE FITTING.

(a)Find the correct torque value (Ref. 20-23-12, P. Block 1).

NOTE : To find the correct torque value, you must know the material and the size of the parts you assemble.
If the connection has different materials, you must use the torque value for the weakest material.

(b)Get the applicable torque wrench and the applicable wrench adapter for the nut and an applicable second wrench to apply the countertorque to the fitting.
We recommend the tools from the **STANDARD TORQUE TOOL SET (98F29003000000)**.

(c)Set the torque wrench to the applicable value.
When you use a wrench adapter, you must adjust the value (Ref. Fig. 002).

(d)Position the torque wrench on the sleeve nut and the countertorque wrench on the fitting (Ref. Fig. 003).

NOTE : We recommend that you install the wrench adapter in the same axis as the torque wrench.

NOTE : The torque wrench must always be installed on the nut (female part) and the countertorque wrench on the fitting (male

part).

(e)Apply a slow and continuous force on the torque wrench until you reach the set torque value.

NOTE : Always pull (or push) at right angles to the handle of the torque wrench.
Try to apply load to the center of the hand grip of the torque wrench.
Pull with fingers only. Do not grasp the hand grip.

(f)Double tightening torque

R 1 You can do the double torque procedure for all the parts you
R assemble:
- torque the nut to the correct value
- loosen the nut by one turn
- torque the nut again to the correct value.

(g)If applicable, torque the locknut of the swivel bulkhead fitting to the correct torque value.
Hold the fitting with the applicable countertorque wrench and torque the locknut with the applicable torque wrench.

(h)Torque the clamp blocks to 0.2 m.daN (17.7 lbf.in.).

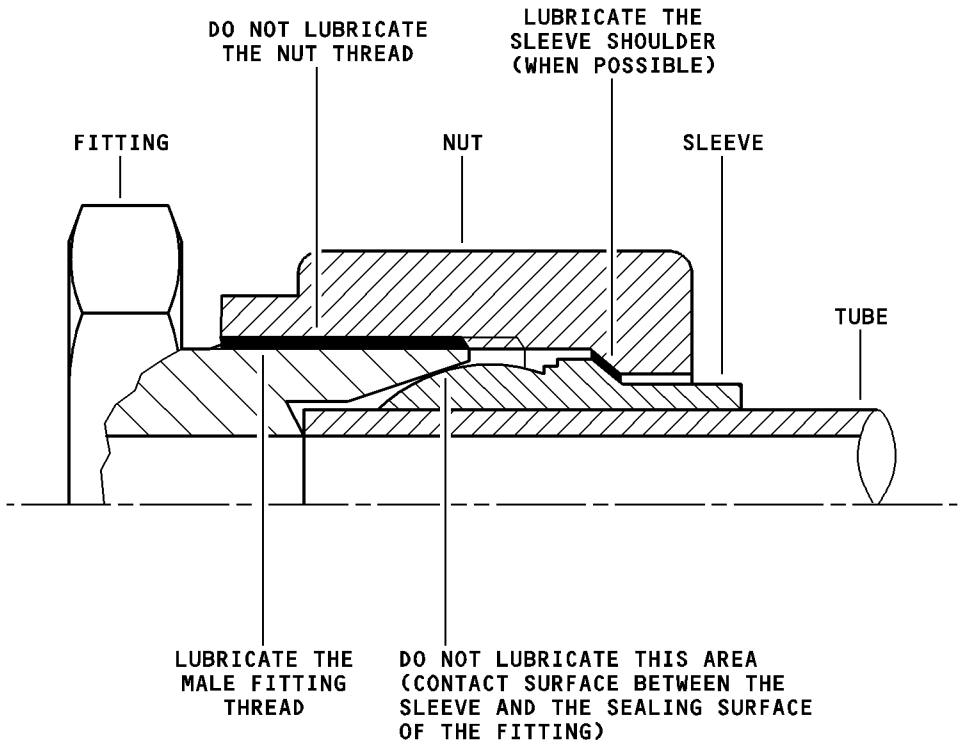
D. Close-up

(1)Make sure that the work area is clean and clear of tool(s) and other items.

(2)Do the applicable bleeding procedure (Ref. 29-00-00, P. Block 401).

(3)Pressurize the aircraft hydraulic system to nominal pressure and do a check for leaks.

(4)Mark the tightened fittings with a red line (Ref. 20-23-22, P. Block 1).



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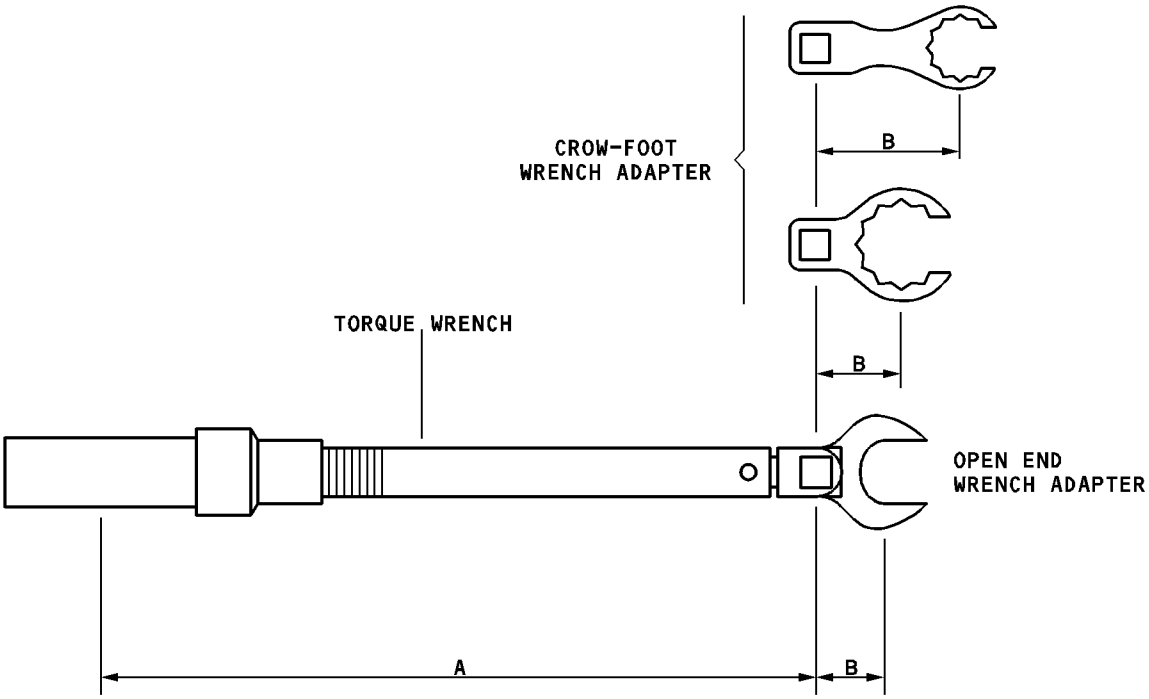
R

Lubrication of the Connections
Figure 001



WHEN YOU USE A WRENCH ADAPTER, YOU MUST
ADJUST THE TORQUE VALUE.
USE THIS FORMULA TO ADJUST THE TORQUE VALUE:

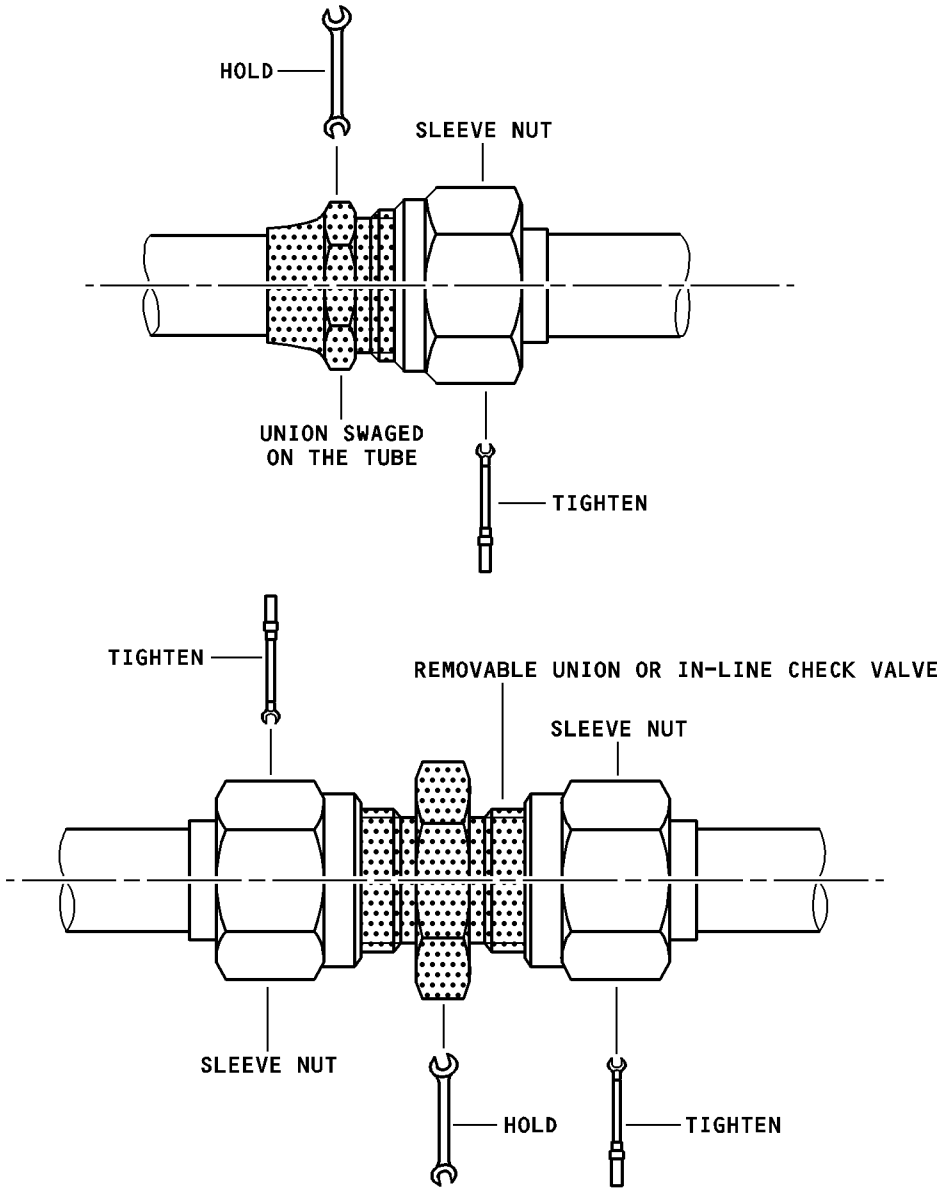
$$T' = \frac{T \times A}{A + B}$$

T' = NEW TORQUE VALUE (ADJUSTED) TO BE SET ON THE TORQUE WRENCH.

T = SPECIFIED TORQUE VALUE (APPLIED ON THE CONNECTION).

BM5 20 23 11 0 NBM0 00

R Adjustment of the Torque Value
Figure 002



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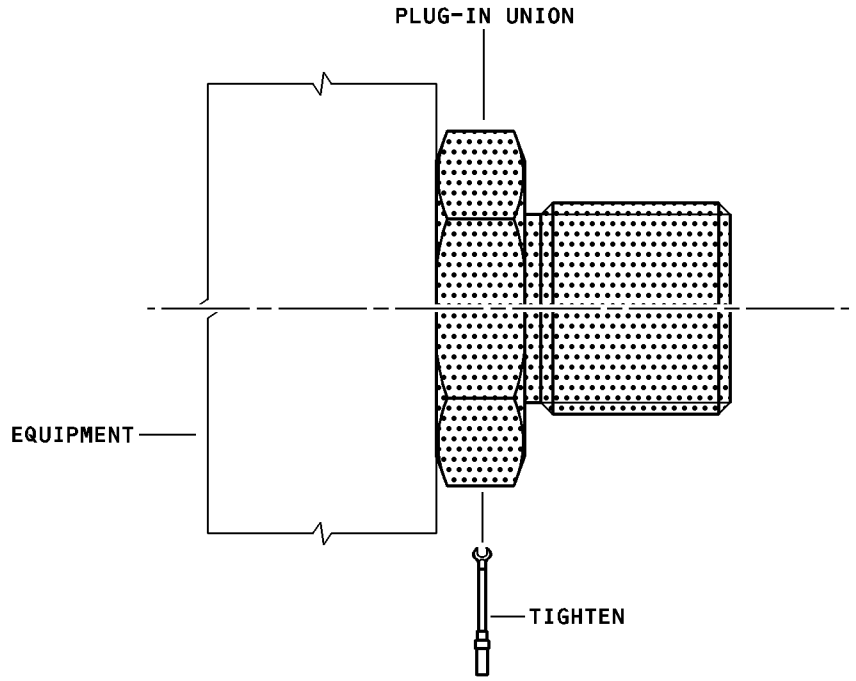
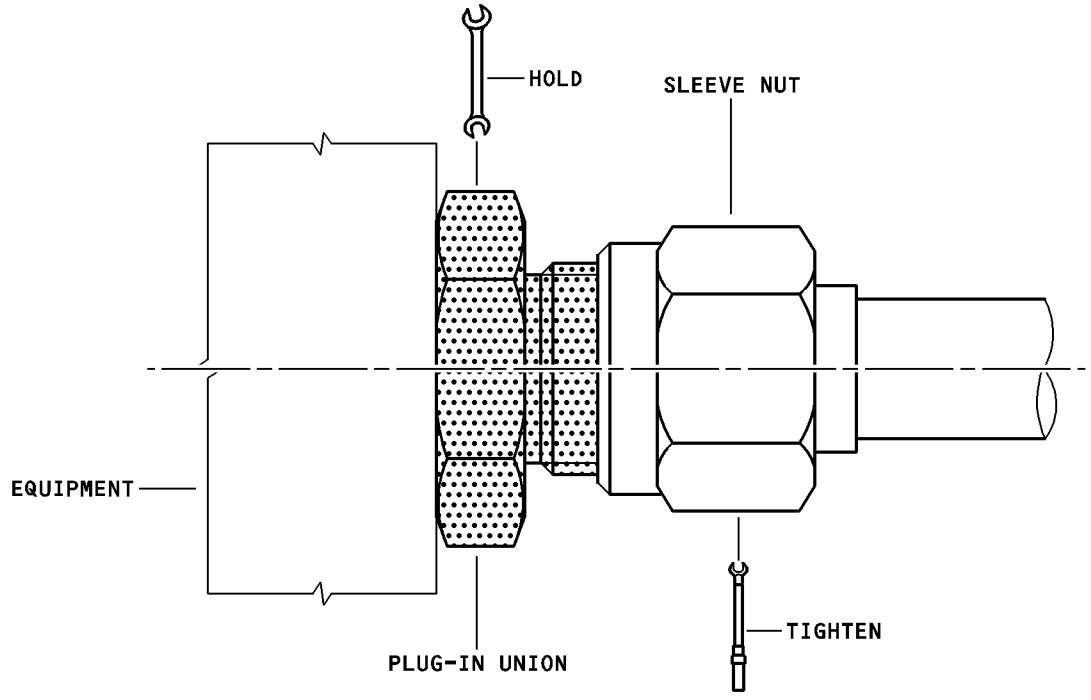
HOLD THE UNION WITH A SECOND WRENCH TO APPLY A COUNTER TORQUE AND TIGHTEN THE SLEEVE NUT TO THE APPLICABLE TORQUE VALUE.

Typical Examples of Connections
(Sheet 1/6)
Figure 003

R



1 - FIRST TIGHTEN THE PLUG-IN UNION TO THE APPLICABLE TORQUE VALUE.

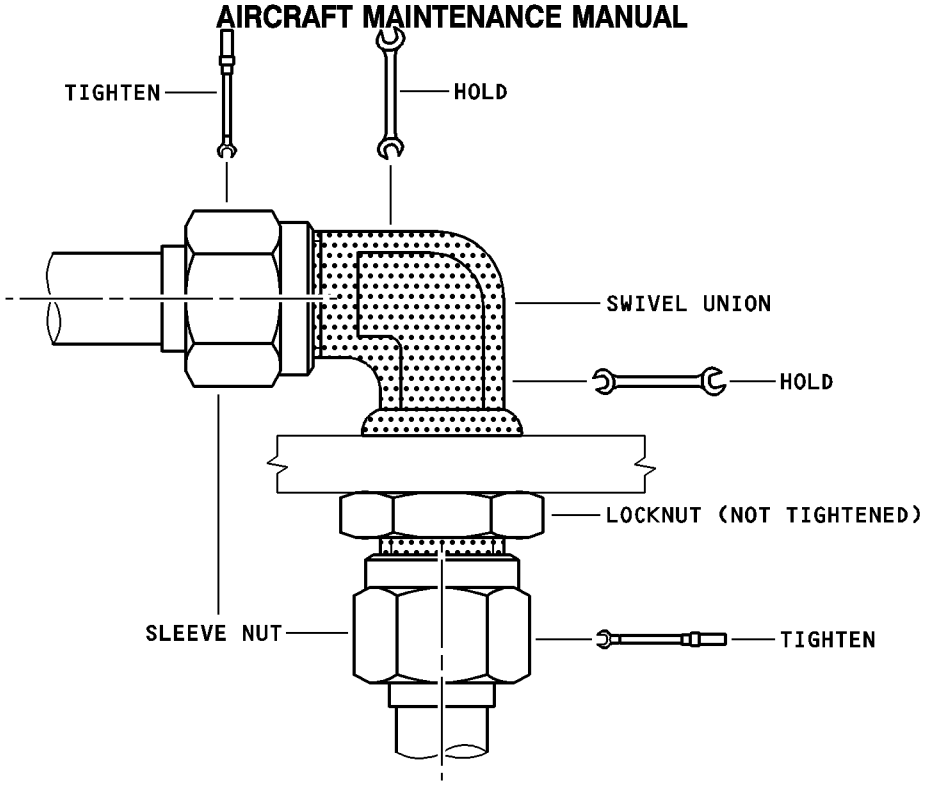


2 - THEN HOLD THE PLUG-IN UNION WITH A SECOND WRENCH TO APPLY A COUNTERTORQUE AND TIGHTEN THE SLEEVE NUT TO THE APPLICABLE TORQUE VALUE.

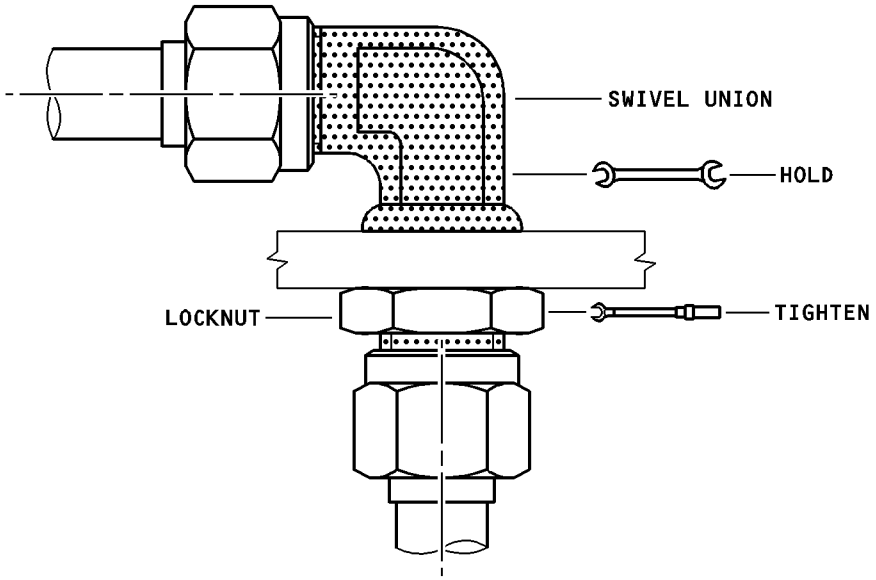
BM5 20 23 11 0 NCMB 00

Typical Examples of Connections
(Sheet 2/6)
Figure 003

R



1 - FIRST HOLD THE SWIVEL UNION WITH A SECOND WRENCH TO APPLY A COUNTERTORQUE AND TIGHTEN THE SLEEVE NUTS TO THE APPLICABLE TORQUE VALUE.

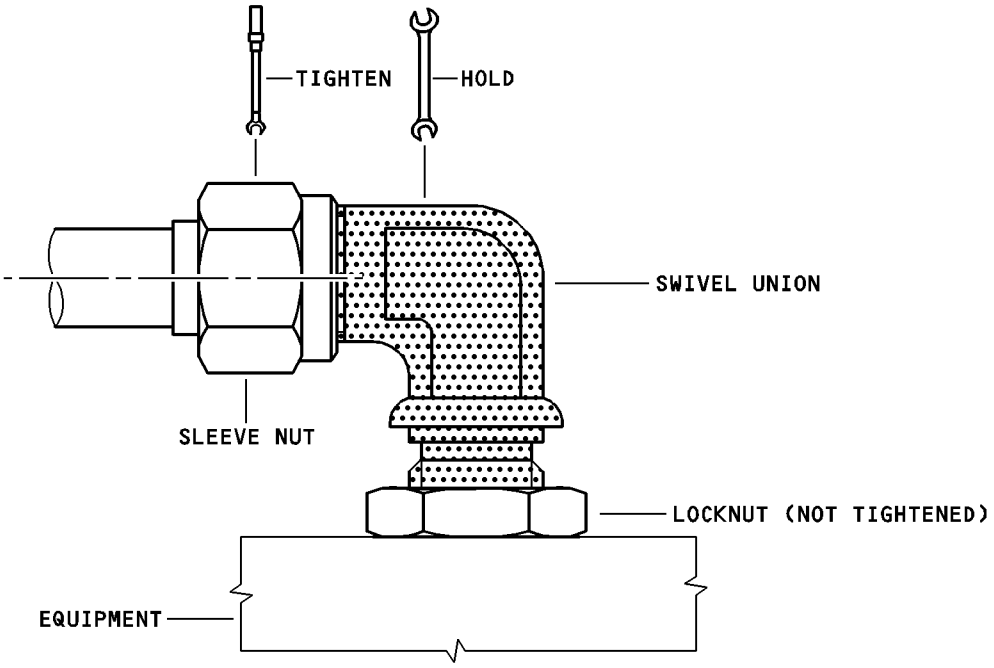


2 - THEN HOLD THE SWIVEL UNION WITH A SECOND WRENCH TO APPLY A COUNTERTORQUE AND TIGHTEN THE LOCKNUT TO THE APPLICABLE TORQUE VALUE.

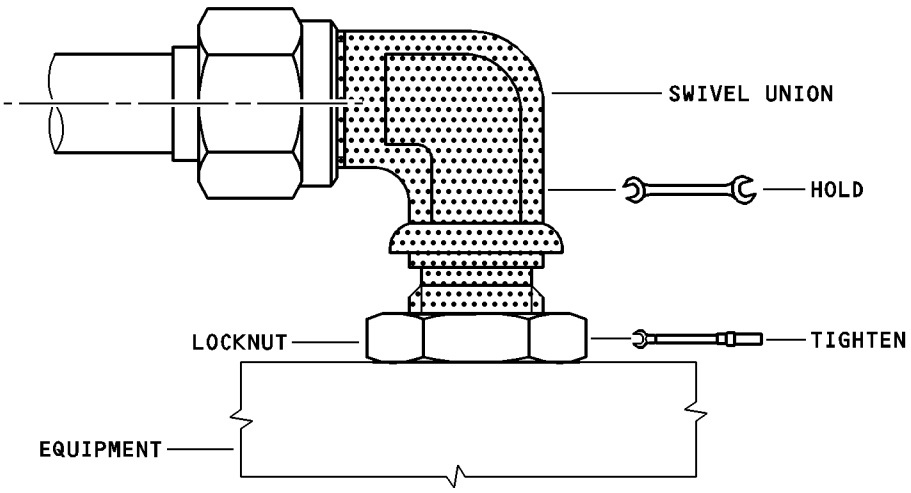
BM5 20 23 11 0 NCMC 00

Typical Examples of Connections
(Sheet 3/6)
Figure 003

R



1 - FIRST HOLD THE SWIVEL UNION WITH A SECOND WRENCH TO APPLY A COUNTERTORQUE AND TIGHTEN THE NUT SLEEVE TO THE APPLICABLE TORQUE VALUE.

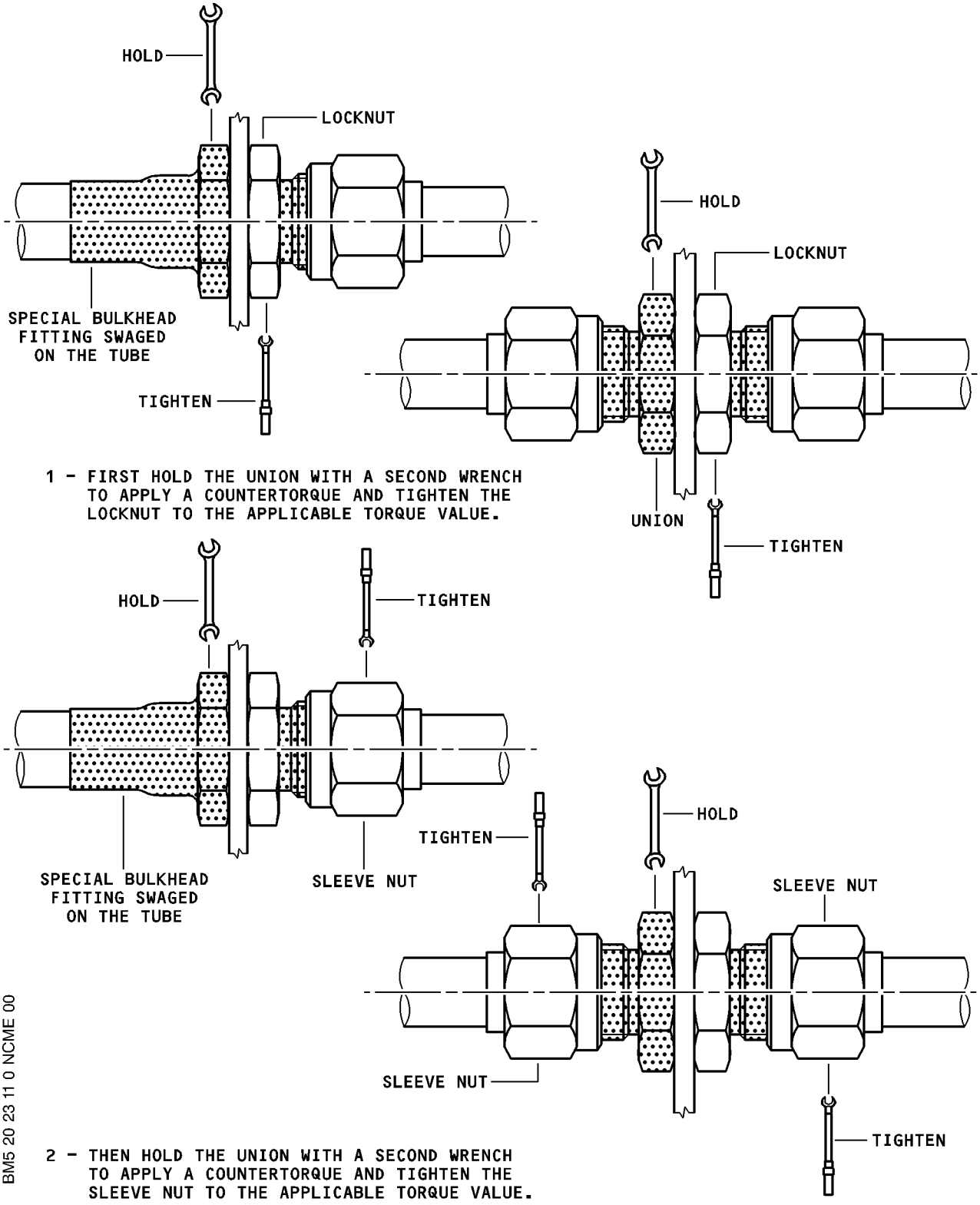


2 - THEN HOLD THE SWIVEL UNION WITH A SECOND WRENCH TO APPLY A COUNTERTORQUE AND TIGHTEN THE LOCKNUT TO THE APPLICABLE TORQUE VALUE.

BM5 20 23 11 0 NCMD 00

Typical Examples of Connections
(Sheet 4/6)
Figure 003

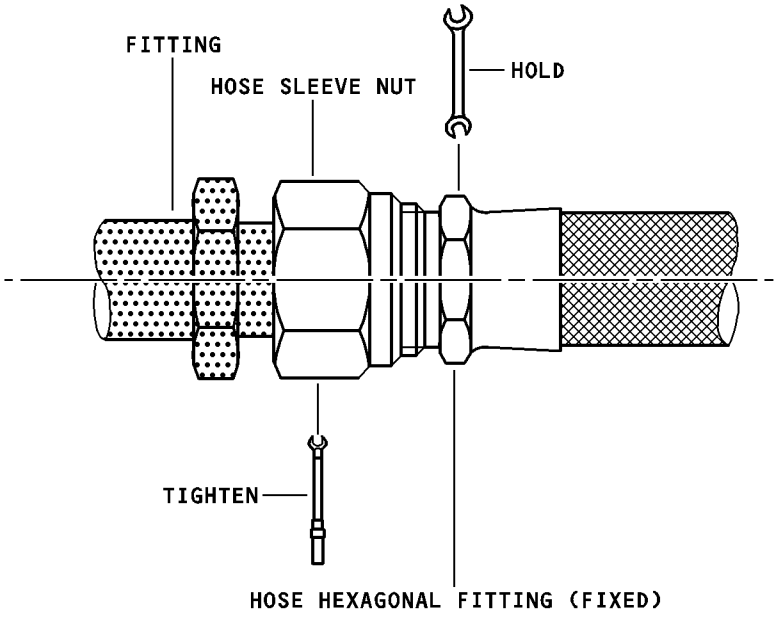
R


HOLD
LOCKNUT
SPECIAL BULKHEAD FITTING SWAGED ON THE TUBE
TIGHTEN
1 - FIRST HOLD THE UNION WITH A SECOND WRENCH TO APPLY A COUNTERTORQUE AND TIGHTEN THE LOCKNUT TO THE APPLICABLE TORQUE VALUE.
HOLD
LOCKNUT
UNION
TIGHTEN
HOLD
TIGHTEN
SPECIAL BULKHEAD FITTING SWAGED ON THE TUBE
SLEEVE NUT
TIGHTEN
HOLD
SLEEVE NUT
SLEEVE NUT
TIGHTEN
2 - THEN HOLD THE UNION WITH A SECOND WRENCH TO APPLY A COUNTERTORQUE AND TIGHTEN THE SLEEVE NUT TO THE APPLICABLE TORQUE VALUE.

BM5 20 23 11 0 NCME 00

Typical Examples of Connections
(Sheet 5/6)
Figure 003

R



HOLD THE HOSE HEXAGONAL FITTING WITH A SECOND WRENCH TO APPLY A COUNTERTORQUE AND TIGHTEN THE HOSE SLEEVE NUT TO THE APPLICABLE TORQUE VALUE.

BM5 20 23 11 0 NCMF 00

Typical Examples of Connections
(Sheet 6/6)
Figure 003

R

4. Permissible Damages and Defects on Hydraulic Tubing

NOTE : This topic is not applicable to the engine. Refer to the engine manufacturer for the engine tube repairs.

A. Permissible Repair

Generally you repair a tube with a tube made of the same material, but if a tube made of the same material is not available, you can repair the tubes as follows:

- aluminum alloy (6061-T6) tubes repaired with CRES (21.6.9) tubes.

NOTE : If you repair aluminum alloy tubes with CRES tubes, think of the weight penalty.

B. Permissible Damages and Defects

(Ref. Fig. 004, 005)

NOTE : When damage or defects on tubing is more than the permissible limits given below, tubing shall be discarded or repaired as specified in this topic.

(1)Permissible limits for traces of impact and surface defects

NOTE : Surface defects are discontinuities such as:

- nicks
- scratches
- cracks and forging laps
- scores
- bends
- corrosion pits.

(a)Sharp-bottomed surface defects:

- maximum : 5 % of tube wall thickness.

(b)Round-bottomed surface defects:

- maximum : 10 % of tube wall thickness.

NOTE : Sharp-bottomed surface defects and traces of impact are damage with a 90 degree or less angle at the bottom. All others are round-bottomed.

(c)Sharp-bottomed traces of impact:

- not permitted.

(d)Round-bottomed traces of impact:

- maximum : 2 % of tube nominal diameter.

NOTE : Length or width of trace of impact must not be more than 5 mm (0.2 in.).
When there is a surface defect with a sign of a dent, do an analysis of each type of damage.

R 5. Repairs to Hydraulic Tubes (Ref. Fig. 006)

NOTE : The repair procedure for the hydraulic tubes can be used for the pneumatic tubes which have an A29XXXXXXXXXX part number.

The presently approved repair procedure for hydraulic tubes in 21.6.9 corrosion-resistant steel or 6061-T6 aluminum alloy, may be accomplished using:

R For the permanent repair of hydraulic tubes:
R - HARRISON sleeve and union elastomerically-swaged fittings,
R - HARRISON H-Fittings,
- PERMASWAGE fittings,

TUBE MATERIAL: LIGHT ALLOY 6061-T6 (ASN-A3410/DAN40)

		1/4	3/8	1/2	5/8	3/4	1	1 - 1/2
OUTER DIAMETER OD	in.	6.350	9.525	12.700	15.875	19.050	25.400	38.100
	Dash	-4	-6	-8	-10	-12	-16	-24
THICKNESS T	inch	0.035	0.035	0.035	0.035	0.035	0.048	0.035
	mm	0.889	0.889	0.889	0.889	0.889	1.219	0.889
OPERATING PRESSURE	PSI	1000	1000	1000	1000	1000	1000	80
	Bar	70	70	70	70	70	70	5.5
SHARP-BOTTOMED DEFECT A	in.	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	mm	0.044	0.044	0.044	0.044	0.044	0.061	0.044
ROUND-BOTTOMED DEFECT B	in.	0.004	0.004	0.004	0.004	0.004	0.005	0.004
	mm	0.089	0.089	0.089	0.089	0.089	0.122	0.089
ROUND-BOTTOMED IMPACT C	in.	0.005	0.007	0.010	0.012	0.015	0.020	0.030
	mm	0.127	0.191	0.254	0.318	0.381	0.508	0.762

A < 5% T
B < 10% T
C < 2% OD

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Permissible Tube Defect Depth - Light Alloy Tube Material
Figure 004

TUBE MATERIAL: STAINLESS STEEL 21.6.9 (ASN-A3288)

OUTER DIAMETER OD	in.	1/4	3/8	1/2	5/8	3/4	1	1 - 1/2
	mm	6.350	9.525	12.700	15.875	19.050	25.400	38.100
	Dash	-4	-6	-8	-10	-12	-16	-24
THICKNESS T	inch	0.016	0.019	0.026	0.032	0.039	0.051	0.024
	mm	0.406	0.508	0.660	0.838	0.991	1.321	0.609
OPERATING PRESSURE	PSI	3000	3000	3000	3000	3000	3000	80
	Bar	206	206	206	206	206	206	5.5
SHARP-BOTTOMED DEFECT A	in.	0.001	0.001	0.001	0.002	0.002	0.003	0.001
	mm	0.020	0.025	0.033	0.042	0.050	0.066	0.030
ROUND-BOTTOMED DEFECT B	in.	0.002	0.002	0.003	0.003	0.004	0.005	0.002
	mm	0.041	0.051	0.066	0.084	0.099	0.132	0.061
ROUND-BOTTOMED IMPACT C	in.	0.005	0.007	0.010	0.013	0.015	0.020	0.030
	mm	0.127	0.191	0.254	0.318	0.381	0.508	0.762

A < 5% T
B < 10% T
C < 2% OD

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Permissible Tube Defect Depth -
Stainless Steel Tube Material
Figure 005

- CRYOFIT couplings 3PHS111-XX,
- RYNGLOK R8 fittings,

For the temporary repair of hydraulic tubes:

- Temporary Repair Scheme,
- Temporary Repair by Welding.

In both cases, repairs are performed using special tools suited to each swaging method.

A. Permissible Repair

NOTE : This topic is not applicable to the engine. Refer to the engine manufacturer for the engine tube repairs.

Generally you repair a tube with a tube made of the same material, but if a tube made of the same material is not available, you can repair the tubes as follows:

- aluminum alloy (6061-T6) tubes repaired with CRES (21.6.9) tubes.

NOTE : If you repair aluminum alloy tubes with CRES tubes, think of the weight penalty.

B. Equipment and Materials

NOTE : If a tube in 6061 - T6 aluminum alloy is not available in stock, it can be replaced by a high pressure tube in 21.6.9 corrosion resistant steel.

ITEM	DESIGNATION
(1)	PERMASWAGE Repair Kit DLT Series or D12000 Series
(2)Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
(3)Material No. 08-024	Bonding and Adhesive Compounds (Ref. 20-31-00)
(4)Material No. 08-009	Bonding and Adhesive Compounds (Ref. 20-31-00)
(5)Material No. 13-002	Pretreatment for Painting (Ref. 20-31-00)
(6)Material No. 16-001C	Structure Paints (Ref. 20-31-00)
(7)Material No. 16-020	Structure Paints (Ref. 20-31-00)
(8)	Scotch - Brite Pad
(9)	Emery Cloth - Grade No. 400
10)	Emery Cloth - Grade No.240
11)Material No. 02-003	Hydraulic Fluids (Ref. 20-31-00)
12)Material No. 03-001	Oils (Ref. 20-31-00)
13)Material No. 05-043	Special Materials (Ref. 20-31-00)
Referenced Procedure	
- 20-23-12, P. Block 1	Specified Torque Values for Unions
- 29-00-00, P. Block 401	General

R C. Repair Using Permaswage Fittings

R This is an approved repair procedure.

R This repair procedure is applicable to:

R - Corrosion-resistant steel (21.6.9) tubes Ref. ASNA3288, sizes -04 to -24.

R - Aluminum alloy (6061-T6) tubes Ref. ASNA3410, DAN40, sizes -04 to -16 and -24.

ITEM		DESIGNATION
(1)		Clean Cloth
(2)		Grade 400 Emery Cloth
(3)		Scotch-brite Pad
(4)		Grade 240 Emery Cloth
(5)		PUMP-PERMASWAGE AIR DRIVEN (DLT02MAPP1000)
(6)		REPAIR KIT, FIELD-SIZE 04 TO 24 (DLTFRPSKT3028A, DLT series or D12000 series)
(7)		TOOL, MARKING (TPE016)
(8)Material No. 02-003		Hydraulic Fluids (Ref. 20-31-00)
(9)Material No. 03-001		Oils
10)Material No. 11-003		Cleaning Agents (Ref. 20-31-00)
11)Material No. 13-002		Pretreatment for Painting (Ref. 20-31-00)
12)Material No. 16-001C		Structure Paints (Ref. 20-31-00)
13)Material No. 16-020		Structure Paints (Ref. 20-31-00)
Referenced Procedure		
- 29-00-00, P. Block 401		General - Removal/Installation

(1)General (Ref. Fig. 007)

Use this approved repair procedure to repair hydraulic tubes made of 21.6.9 corrosion-resistant steel or 6061-T6 aluminum alloy.

NOTE : You can use the PERMASWAGE repair procedure to repair tubes installed with HARRISON fittings.

There are two types of PERMASWAGE fittings:

- permanent,
- separable (that you can remove).

The table below gives an example of standards for the swaged fittings that are available.

PERMANENT FITTINGS	SEPARABLE FITTINGS		STRAIGHT MALE AND FEMALE UNION, NUTS FOR FEMALE UNIONS
ABS0335	ABS0138	ASNA3750	ASNA3758
ABS0451	ABS0272	ASNA3757	ASNA3771
ABS0452	ABS0450	ASNA3764	ASNA3773
ABS0477	ABS0453	ASNA3765	ASNA3774
ABS0478	ABS0464	ASNA3767	NSA855022
ABS0566	ABS0527	ASNA3768	NSA855023
ABS0567	ABS0534	ASNA3772	NSA855024
ABS0568	ABS0535	NSA855019	NSA855027
ASNA3752	ABS0542	NSA855020	NSA855031
ASNA3753	ABS0544	NSA855025	NSA855036
ASNA3756	ABS0545	NSA855026	
ASNA3766	ABS0564	NSA855028	
NSA85506 up	ABS0565	NSA855029	
to NSA855009	ABS0650	NSA855030	
NSA855014	ABS0658	NSA855032	
NSA855015	ABS0669	NSA855033	
	ABS0675	NSA855035	

PERMANENT FITTINGS	SEPARABLE FITTINGS	STRAIGHT MALE AND FEMALE UNION, NUTS FOR FEMALE
	ABS0711 NSA855037 NSA855039	

You can swage **PERMASWAGE** fittings on the aircraft.
NOTE : The separable fittings have an **MS33514** or **MS33515** threaded end or a sleeve with a nut.
To repair the tubing with the **PERMASWAGE** system, you must:
- cut the tube,
- deburr the tube,
- make the marks for tube insertion,
- put the swaging tool into position,
- swage the tube,
- do a check of the tube joint.

You must use the applicable **PERMASWAGE** repair kit **DLTFRPSKT3028A**, **DLT** series or **D12000** series tools (vendor code **F6087**) (**D12000** series is the previous generation).(Ref. Fig. 008, 009)

(2)Selection of **PERMASWAGE** Tooling and Unions (Ref. Fig. 012, 011)
(Ref. Fig. 008, 009)

(a)Get the **REPAIR KIT, FIELD-SIZE 04 TO 24 (DLTFRPSKT3028A,** **DLT** series or **D12000** series).
(Ref. Fig. 012, 008, 009)
This kit includes:
- head assemblies,
- power units,
- cutting tools
- deburring tools,
- inspection gages,
- marking tools,
- a manual pump assembly.

NOTE : You can use the **TOOL, MARKING (TPE016)** as an alternative to the **DLT** marking tools that are included in the **REPAIR KIT, FIELD-SIZE 04 TO 24 (DLTFRPSKT3028A).**

NOTE : You can use the **PUMP-PERMASWAGE AIR DRIVEN (DLT02MAPP1000)** as an alternative to the manual pump assembly that is included in the **REPAIR KIT, FIELD-SIZE 04 TO 24 (DLTFRPSKT3028A).**

(b)Get the correct union assemblies: (Ref. Fig. 011).
- Use aluminum union assemblies to repair light alloy tubes **(ASNA3410, DAN40).**
- Use stainless-steel union assemblies to repair corrosion-resistant and steel tubes **(ASNA3288).**

(3)Selection of the Repair Procedure (Ref. Fig. 010).

(a)Measure the length L of the defect on the damaged tube.

1 Use the single-union repair procedure if:
- The length L of the defect is less than the maximum value (L **MAX.**).

2 Use the two-union repair procedure if:
- The length L of the defect is more than the maximum value (L **MAX.**).
- The defect is in a bend.
- The defect is less than the minimum distance (**N MIN.**) from the end

TUBES / REPAIR OF HYDRAULIC TUBES	HP LINES							LP LINES							
	CORROSION RESISTANT STEEL (ASNA3288)							ALUMINUM ALLOY (ASNA3410/DAN40/SL16)							
SIZE	-04	-06	-08	-10	-12	-16	-20	-24	-04	-06	-08	-10	-12	-16	-24
PERMASWAGE FITTINGS SEE 20-23-11-5.C	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
HARRISON SLEEVE AND UNION ELASTOMERICALLY-SWAGED FITTINGS SEE 20-23-11-5.D	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
HARRISON H-FITTINGS SEE 20-23-11-5.E	P	P	P	P	P	P	NA		P	P	P	P	NA		
RYNGLOK R8 UNIONS SEE 20-23-11-5.H	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
CRYOFIT COUPLINGS 3PHS111-XX SEE 20-23-11-5.G	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
MS21922 SLEEVE SEE 20-23-11-5.F	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
WELDING SEE 20-23-11-5.I	T	T	T	T	T	T	NA	T	NA						
FLEXIBLE HOSES SEE 20-23-11-5.F	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T

P: PERMANENT REPAIR

T: TEMPORARY REPAIR

NA: NOT APPLICABLE

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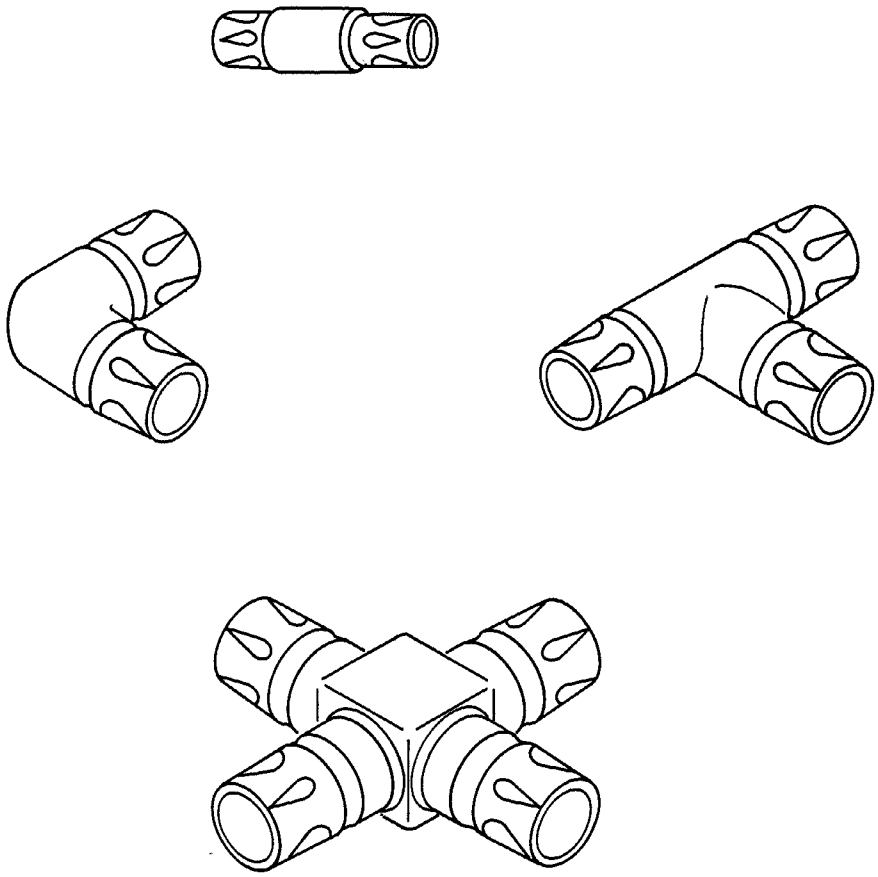
Permanent and Temporary Repair of Hydraulic Tubes
Figure 006



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PERMASWAGE - Swaging Principle
Figure 007

TUBE SIZES 1/16in.	MATERIAL INCLUDED IN KITS (DLT SERIE)						
	HEAD ASSEMBLIES	POWER UNITS	CUTTING TOOLS	DEBURRING TOOLS		INSPECTION GAGES	MARKING TOOLS
				BODY	STEMS		
4	DLT05PSHA3004	DLT05MAPW0000	D12530-001	D9851-14	D9851-13-04	D12-9892-04	DLT5302-013-01
5 6	DLT10PSHA3005 DLT10PSHA3006	DLT10MAPW0000	D12530-001	D9851-14	D9851-13-05 D9851-13-06	D12-9892-05 D12-9892-06	DLT5302-013-01
8 10	DLT20PSHA3008 DLT20PSHA3010	DLT20MAPW0000	D12531-001	D9850-14	D9850-13-08 D9850-13-10	D12-9892-08 D12-9892-10	DLT5302-031-01
12	DLT30PSHA3012	DLT30MAPW0000	D12531-001	D9850-14	D9850-13-12	D12-9892-12	DLT5302-031-01
16 20 24	DLT40PSHA3016 DLT40PSHA3020 DLT40PSHA4024A	DLT40MAPW0000	D12532-001	D9849-15	D9849-13-16 D9849-13-20 D9849-13-21 D9849-13-24	D12-9892-16 D12-9892-20 D12-9892-24	DLT5302-040-01

NOTE: A D10058 MARKING PEN IS INCLUDED IN ALL KITS

TUBE SIZES	KIT PART NUMBER
4	DLT05PSKT3000
5, 6	DLT10PSKT3002
8, 10	DLT20PSKT3000
12	DLT30PSKT3000
6, 20, 24	DLT40PSKT3000A

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R

PERMASWAGE - Series DLT Repair Kits
Figure 008

TUBE SIZES 1/16in.	MATERIAL INCLUDED IN KITS (DLT SERIE)									
	HEAD ASSEMBLIES		POWER UNITS		CUTTING TOOLS	DEBURRING TOOLLS		INSPECTION GAGES	MARKING TOOLS
	CODE	PART NUMBER	CODE	PART NUMBER		BODY	STEMS		
4 5 6	02	D12204-56 D12205-56 D12206-56	01	D12550-013	D12530-001	D9851-14	D9851-13-04 D9851-13-05 D9851-13-06	D12-9892-04 D12-9892-05 D12-9892-06	DLT5302-013-01
8 10	07	D12208-56 D12210-56	02	D12550-022	D12531-001	D9850-14	D9850-13-08 D9850-13-10	D12-9892-08 D12-9892-10	DLT5302-031-01
12	08	D12225-012-056	11A00	D12550-031	D12531-001	D9850-14	D9850-13-12	D12-9892-12	DLT5302-031-01
16 20 24	09	D12216-56 D12220-56 D12224-56	04	D12550-040	D12532-001	D9849-15	D9849-13-16 D9849-13-20 D9849-13-21 D9849-13-24	D12-9892-16 D12-9892-20 D12-9892-24	DLT5302-040-01

NOTE: A D10058 MARKING PEN IS INCLUDED IN ALL KITS

REPAIR KIT DESIGNATION APPLICABLE TO TUBE SIZES:

D12102C XX - XX

- XX: CODE NUMBER OF THE POWER UNIT
- XX: CODE NUMBER OF THE HEAD ASSEMBLIES
- D12102C: BASIC KIT NUMBER

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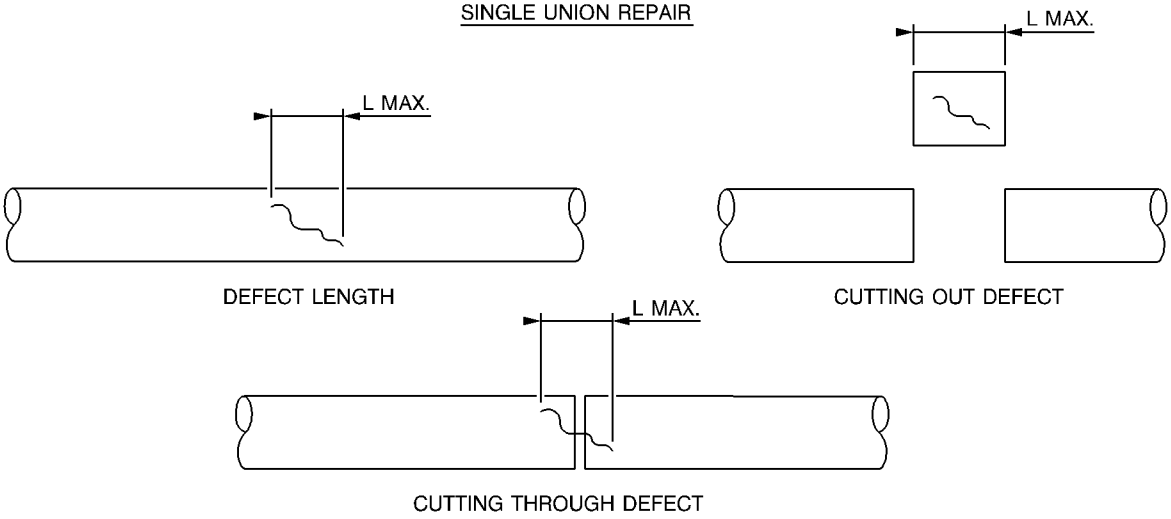
PERMASWAGE - Series D12000 Repair Kits
Figure 009

R

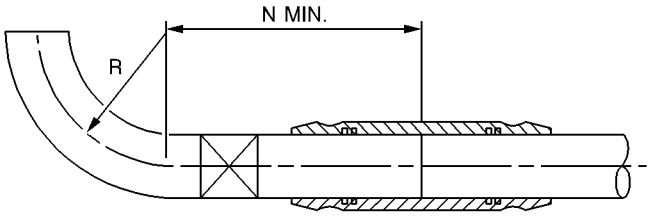
R of a bend.
R (b)Single-union repair procedure.
R 1 Remove (cut out) the damaged part of the tube or cut the tube through the defect.
R 2 Use a **PERMASWAGE** union to connect the two parts of the tube.
R (c)Two-union repair procedure.
R 1 Remove (cut out) the damaged part of the tube.
R You must remove a minimum length (**M MIN.**) of tube.
R 2 Replace the removed part of the tube with:
R - An equal or smaller (but almost the same) length of equivalent tube.
R - Two **PERMASWAGE** unions.
R (4)Cut the damaged part of the tube (Ref. Fig. 010)
R (Ref. Fig. 013)
R (a)For the single-union repair procedure.
R 1 Cut the damaged part of the tube with the applicable cutting tool (included in the **REPAIR KIT, FIELD-SIZE 04 TO 24 (DLTFRPSKT3028A)**).
R There are two procedures to cut the tube for a single-union repair.
R - Remove (cut out) the damaged part of the tube.
R - Cut through the center of the defect.
R **NOTE** : This is not the best procedure because the defect can cause damage to the sealing surface of the union.
R If you use this procedure, you must be careful:
R - To cut the tube in the center of the defect.
R - To put the union in the center between the installation marks.
R a Remove the damaged parts of the tube and the defective ends with the applicable **PERMASWAGE** chiples cutting-tool:
R **D12530-001**, tubes from 1/4" thru 3/8"
R **D12531-001**, tubes from 1/2" thru 3/4"
R **D12532-001**, tubes from 1" thru 1-1/2"
R - Put the tubing cutter into the correct position on the tube.
R - Tighten the drive screw until the cutter wheel lightly touches the tube. Then give the drive screw a 1/8 to 1/4 turn.
R - Turn the ratchet handle through the arc of clearance until it turns loosely.
R - Do the steps again to cut through the tube.
R - Cut the tube slowly and smoothly to make sure that the end of the tube does not changes its shape.
R - Regularly lubricate the ratchet, the rollers and the cutter wheel with **OILS (Material No. 03-001)** for easy operation.
R (b)For the two-union repair procedure.
R 1 Cut out the damaged part of the tube with the applicable cutting tool (included in the **REPAIR KIT, FIELD-SIZE 04 TO 24 (DLTFRPSKT3028A)**).
R You must remove a minimum length (**M MIN.**) of tube to do this procedure correctly.
R a Remove the damaged parts of the tube and the defective ends with the applicable **PERMASWAGE** chipless cutting-tool:
R **D12530-001**, tubes from 1/4" thru 3/8"
R **D12531-001**, tubes from 1/2" thru 3/4"
R **D12532-001**, tubes from 1" thru 1-1/2"
R - Put the tubing cutter into the correct position on the tube.

R - Tighten the drive screw until the cutter wheel lightly touches
R the tube. Then give the drive screw a 1/8 to 1/4 turn.
R - Turn the ratchet handle through the arc of clearance until it
R turns loosely.
R - Do the steps again to cut through the tube.
R - Cut the tube slowly and smoothly to make sure that the end of the
R tube does not changes its shape.
R - Regularly lubricate the ratchet, the rollers and the cutter wheel
R with OILS (Material No. 03-001) for easy operation.
R (5)Deburr the tube.
R (a)The internal diameter.
R 1 Use the deburring tool and the stem subassembly that are correct for:
R - the diameter of the tube,
R - the thickness of the wall (Ref. Fig. 014).
R 2 Make sure that the deburring tool is clean. Lubricate it with
R HYDRAULIC FLUIDS (Material No. 02-003).
R 3 Prepare to deburr the tube:
R - hold the tube,
R - push in the plunger of the tool,
R - put the stem into the end of the tube,
R - release the plunger to let the stem become expanded and seal the
R tube (Ref. Fig. 015).
R 4 Deburr the tube:
R - continue to hold the tube,
R - apply light pressure on the cutter and at the same time turn the
R knurled clockwise,
R - continue to turn until the tube is deburred.
R 5 Do not push the plunger in, but:
R - carefully and slowly pull the deburring tool from the tube until
R you can see the first ridge of the stem,
R - clean the end of the tube and the stem.
R 6 If the end of the tube is not correctly deburred:
R - push the tool into the tube,
R - do step (d) again,
R - pull the tool out of the tube.
R 7 Fully clean the stem with CLEANING AGENTS (Material No. 11-003) if it
R touched the fluid and dry it immediately.
R (b)The external diameter.
R NOTE : Do not cause damage to the seals of the fittings:
R - the tubes must not have external burrs,
R - the tubes must go freely into the fittings.
R If a tube does not go freely into a fitting (not circular, out
R of tolerance), do not install the fitting.
R 1 Remove the burrs on the external diameter of the tube with Grade 240
R emery cloth.
R Burrs on the external diameter of the tube can cause damage to the
R seals in the fittings. This damage can cause external leakage.
R The surfaces must be clean and without damage:
R - the swaging area must have no deep scratches and must be clean
R (no dust, particles of metal, etc.).
R Before you swage, clean the end of the tube with a clean cloth.

SINGLE UNION REPAIR



MINIMUM STRAIGHT TUBE FOR
SWAGING NEAR A BEND



TUBE SIZE	TUBE DIA.		L MAX.		N MIN.	
	in.	mm	in.	mm	in.	mm
-04	1/4	6.35	0.300	7.60	1.039	26.4
-06	3/8	9.525	0.300	7.60	1.114	28.3
-08	1/2	12.7	0.300	7.60	1.618	41.1
-10	5/8	15.875	0.300	7.60	1.656	42.1
-12	3/4	19.050	0.300	7.60	1.728	43.9
-16	1	25.4	0.300	7.60	1.874	47.6
-20	1-1/4	31.750	0.300	7.60	1.976	50.2
-24	1-1/2	38.1	0.300	7.60	2.098	53.3

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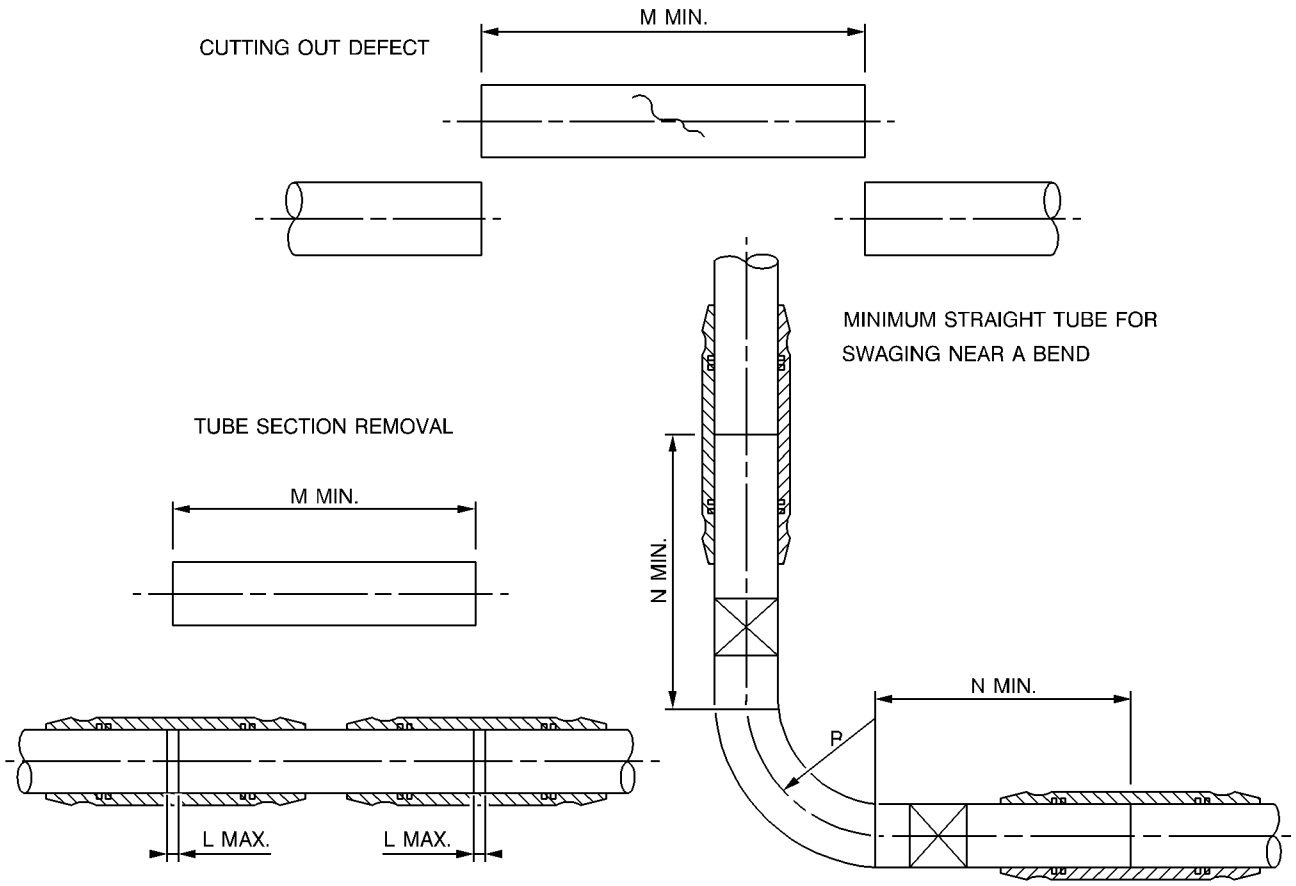
Tubing Repair - Sheet 1/2
Figure 010

R

TWO UNION REPAIR



TUBE SIZE	TUBE DIA.		L MAX.		M MIN.		N MIN.	
	in.	mm	in.	mm	in.	mm	in.	mm
-04	1/4	6.35	0.300	7.60	2.012	51.1	1.039	26.4
-06	3/8	9.525	0.300	7.60	2.161	54.9	1.114	28.3
-08	1/2	12.7	0.300	7.60	3.173	80.6	1.618	41.1
-10	5/8	15.875	0.300	7.60	3.252	82.6	1.656	42.1
-12	3/4	19.050	0.300	7.60	3.394	86.2	1.728	43.9
-16	1	25.4	0.300	7.60	4.390	111.5	1.874	47.6
-20	1-1/4	31.750	0.300	7.60	4.595	116.7	1.976	50.2
-24	1-1/2	38.1	0.300	7.60	6.500	165.1	2.098	53.3

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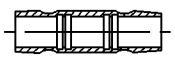
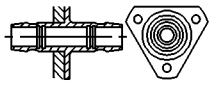
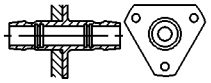
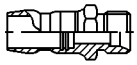
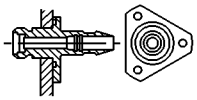
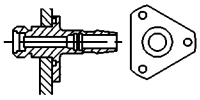
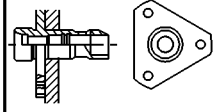
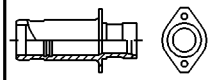
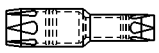
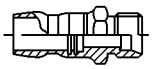
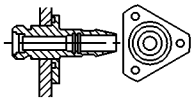
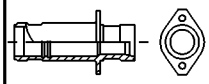
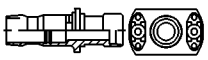
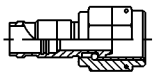
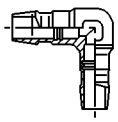
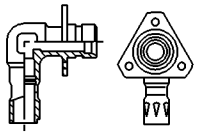
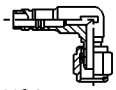
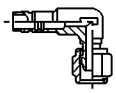
Tubing Repair - Sheet 2/2
Figure 010

	PERMANENT TO PERMANENT		PERMANENT TO FLARELESS		
	SWAGED UNION	SWAGED BULKHEAD UNION	MALE UNION	MALE BULKHEAD UNION	FEMALE UNION
UNION	 NSA855006 (-, D, G)	 ASNA3766 (-, E, G)  ABS0567 (-, E, G)	 NSA855023 (-, E, G)	 ASNA3767 (-, E, G)  ABS1367 (-, E, G) ABS1033 (-, E, G) ABS1125 (-, E) ABS1483 (-, E, G)  ABS0450 (-)  ABS0650 (-, E, G)	ABS1368 (-, N, E, G)
UNION REDUCER	 ABS0335 (-, D, G)		 NSA855027 (-, E)	 ASNA3768 (-, E)  ABS0943 (-, E)  ABS0947 (C)	 NSA855036 (-, N, E, G)
90° ELBOW	 NSA855007 (-, D, G)			 ABS1352 (-, E, G)	 NSA855020 (-, N, E, G) NSA855033 (N, G)
REDUCER					 ASNA3764 (-, N, E, G)

BM5 20 23 11 0 DCMA 00

Union Assemblies - Sheet 1/2
Figure 011

R

BM5 20 23 11 0 DDM0 01

MATERIAL INCLUDED IN KIT DLTFRPSKT3028A

TUBE SIZE	TUBE DIA.		HEAD ASSEMBLY	POWER UNIT	CUTTING TOOL	DEBURRING TOOL		INSPECTION GAGE	MARKING TOOL	MANUAL PUMP ASSEMBLY
	in.	mm				BODY	STEM			
-04	1/4	6.35	DLT05PSHA3004	DLT05MAPW0000	D12530 -001	D9851 -14	D9851-13-04	D12-9892-04	DLT5302-013-01	DLT05MAPM1001
-06	3/8	9.525	DLT10PSHA3006	DLT10MAPW0000			D9851-13-06	D12-9892-06		
-08	1/2	12.7	DLT20PSHA3008	DLT20MAPW0000	D12531 -001	D9850 -14	D9850-13-08	D12-9892-08	DLT5302-031-01	
-10	5/8	15.875	DLT20PSHA3010				D9850-13-10	D12-9892-10		
-12	3/4	19.05	DLT30PSHA3012	DLT30MAPW0000			D9850-13-12	D12-9892-12		
-16	1	25.4	DLT40PSHA3016	DLT40MAPW0000	D12532 -001	D9849 -15	D9849-13-16	D12-9892-16	DLT5302-040-01	
-20	1-1/4	31.75	DLT40PSHA3020				D9849-13-20	D12-9892-20		
-24	1-1/2	38.1	DLT40PSHA4024A				D9849-13-24	D12-9892-24		

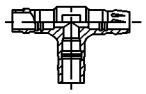
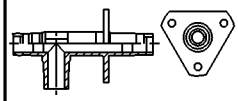
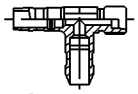
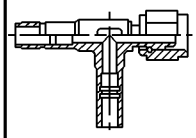
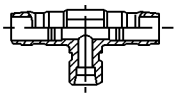
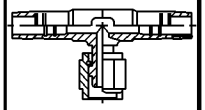
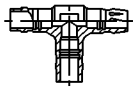
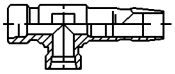
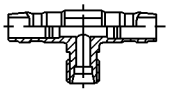
NOTE: A D10058 MARKING PEN IS INCLUDED IN THE KIT

MATERIAL NOT INCLUDED IN KIT DLTFRPSKT3028A

TUBE SIZE	TUBE DIA.		TPE016 MARKING TOOL	AIR DRIVEN PUMP ASSEMBLY
	in.	mm		
-04	1/4	6.35	TPE016-04	DLT02MAPP1000
-06	3/8	9.525	TPE016-06	
-08	1/2	12.7	TPE016-08	
-10	5/8	15.875	TPE016-10	
-12	3/4	19.05	TPE016-12	
-16	1	25.4	TPE016-16	
-20	1-1/4	31.75	TPE016-20	
-24	1-1/2	38.1	TPE016-24	

PERMASWAGE Installation Tooling
Figure 012

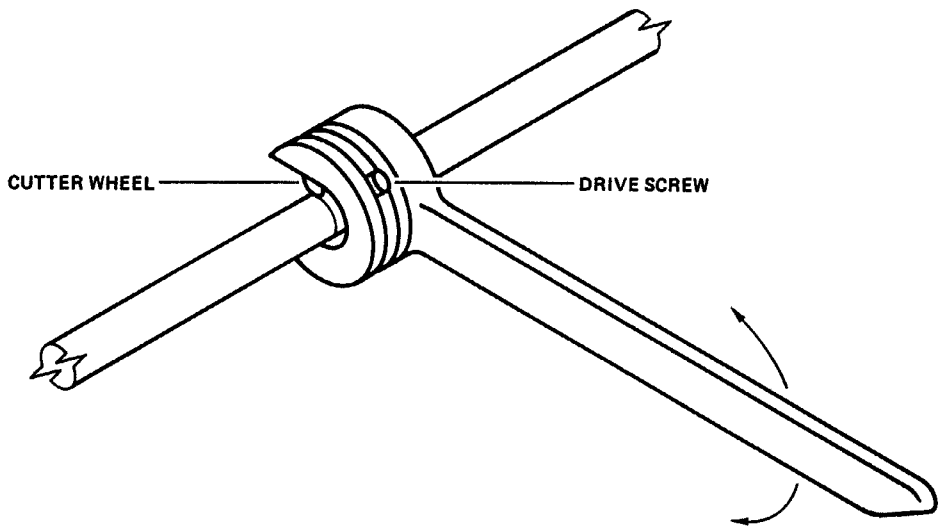
R

	PERMANENT TO PERMANENT		PERMANENT TO FLARELESS		
	SWAGED UNION	SWAGED BULKHEAD UNION	MALE UNION	MALE BULKHEAD UNION	FEMALE UNION
TEE (SEPARABLE ON RUN)	 NSA855008 (-, D, G)	 ABS1406 (E, G)	 ABS0527 (-, E, G) NSA855025 (-, E, G)		 ABS0525 (-)
TEE (SEPARABLE ON SIDE)			 NSA855026 (-, E, G)		 ABS0790 (C, N)
REDUCER	 ASNA3752 (-, D, G)		 ABS0464 (-, E, G)  ASNA3757 (-, E, G)		

UNION MATERIAL	TYPE OF UNION	-04	-06	-08	-10	-12	-16	-20	-24
ALUMINUM	SWAGED	D	D	D	D	D	G	G	G
	WITH A FLARELESS END	E	E	E	E	E	G	G	G
STAINLESS STEEL	SWAGED	-	-	-	-	-	-	-	-
	WITH A MALE FLARELESS END	C, -	C, -	C, -	C, -	C, -	C, -	C, -	C, -
	WITH A FEMALE FLARELESS END	C, -	C, -	C, -	C, -	C, -	N	N	N

BM5 20 23 11 0 DCMB 01

Union Assemblies - Sheet 2/2
Figure 011



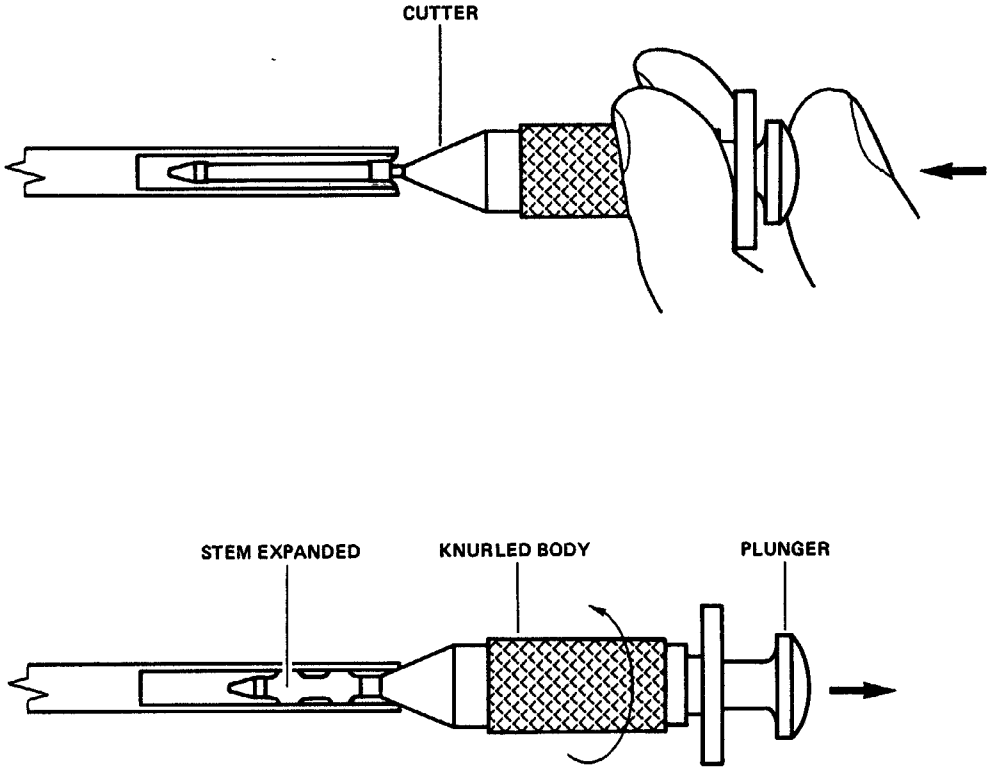
BM5 20 23 11 0 DEMO – 16

Chipless Cutter
Figure 013

SIZE in.	TUBE WALL RANGE	COMPLETE TOOL	COMPONENT PARTS		OPTIONAL STEM ASSEMBLIES
			BODY ASSEMBLY	STANDARD STEM ASSY	
1/4	.028/.050	D9851	D9851-14		D9851-13-03
1/4	.016/.028			D9851-13-04	
5/16	.016/.035			D9851-13-05	
3/8	.016/.035			D9851-13-06	
1/2	.016/.042	D9850	D9850-14	D9850-13-08	
5/8	.016/.058			D9850-13-10	
3/4	.016/.065			D9850-13-12	
1	.020/.083	D9849	D9849-15	D9849-13-16	
1-1/4	.024/.065			D9849-13-20	
1-1/4	.065/.109			D9849-13-21	D9849-13-21
1-1/2	.028/.083			D9849-13-24	

BM5 20 23 11 0 DGM0 17

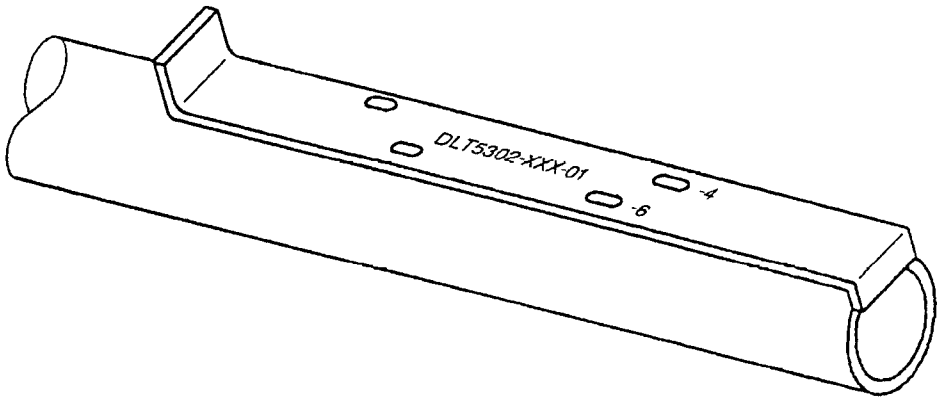
Deburring Tools
Figure 014



BM5 20 23 11 0 DHMO – 16

Deburring Tool Operation
Figure 015

R (c)Remove the paint (if applicable).
R NOTE : You can do the installation on parts that have alodine
R treatment. You must not do the installation on parts that are
R painted.
R 1 Remove the paint, with grade 400 emery cloth, on a sufficient length
R so that you swage the union on a bare area. Make sure that you do not
R make scratches on the tubes when you remove the paint.
R 2 Make sure that all the tube ends are in the correct condition and
R agree with the tube dimension specifications.
R 3 Clean all the tube ends with **CLEANING AGENTS (Material No. 11-003).**
R (6)Make the marks for tube insertion.
R NOTE : These marks give an indication of the depth of the tube in the
R fitting before and after swaging.
R (a)Use a marking tool with the correct dimensions for the tube that you
R must swage:
R **DLT5302-013-01,** tubes from 1/4" thru 3/8"
R **DLT5302-031-01,** tubes from 1/2" thru 3/4"
R **DLT5302-040-01,** tubes from 1" thru 1-1/2"
R (b)Put the marking tool into position on the tube. The lip of the marking
R tool must be against the end of the tube. Make a mark on the tube with
R the marking pen **D10058** (Ref. Fig. 016).
R (c)You can make the marks on the tube without the special tool. But you
R must obey the specified high and low limits for the insertion of the
R end of the tube (Ref. Fig. 017).
R (7)Swage the fitting on the tube.
R (a)Install the fitting on the tube. The end of the fitting must be in the
R area of the mark (Ref. Fig. 018).
R (b)Make sure that you do not cause damage to the seals in the fitting
R when you install it.
R (c)Use a swage tool assembly and power unit that are correct for the
R dimensions of the tube (Ref. Fig. 019).
R (d)Swage with the tool series **DLT.**
R **WARNING : MAKE SURE THAT ONLY APPROVED PERSONNEL USE THIS TOOL.**
R **THIS TOOL OPERATES AT VERY HIGH PRESSURES AND CAN BE**
R **DANGEROUS.**
R (Ref. Fig. 020)
R NOTE : If you swage with the tool series **D12000,** refer to step (e).
R 1 Push the die block assembly out of the head assembly.
R 2 Make sure that the upper and lower dies have the same serial number.
R 3 Put the lower die block on the top of the power unit.
R 4 Connect the power unit to the hydraulic pump.
R 5 Put the head assembly on the fitting and the hydraulic tube. Make
R sure that the bevelled end od the die is toward the center of the
R fitting.
R 6 Put the knurled surface of the power unit and of the head assembly on
R the same side and engage the power unit on the head assembly.
R Make sure that the balls in the lower die block engage with a "click"
R on the head assembly.
R 7 Move the power unit toward the center of the fitting until the stop
R plate touches the fitting.
R 8 Make sure that the end of the fitting is on the reference mark



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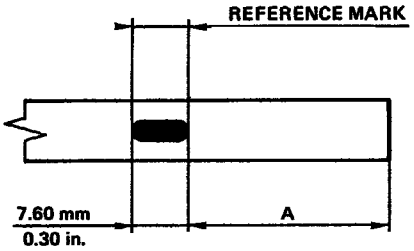
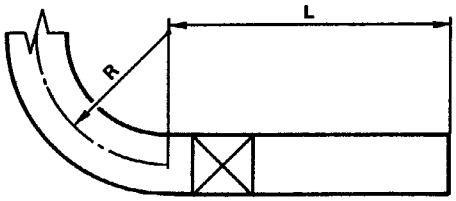
Tube Marking Operation
Figure 016



TUBE SIZES		DIMENSIONS A ± 0.05 in. (± 1.3 mm)	
in.	mm	in.	mm
1/4	6.35	0.615	15.62
5/16	7.93	0.655	16.64
3/8	9.52	0.690	17.53
1/2	12.70	1.193	30.30
5/8	15.87	1.233	31.32
3/4	19.05	1.303	33.10
1	25.40	1.448	36.78
1 1/4	31.75	1.550	39.37
1 1/2	38.10	1.675	42.55

FOR SWAGING ON STRAIGHT TUBE SECTION



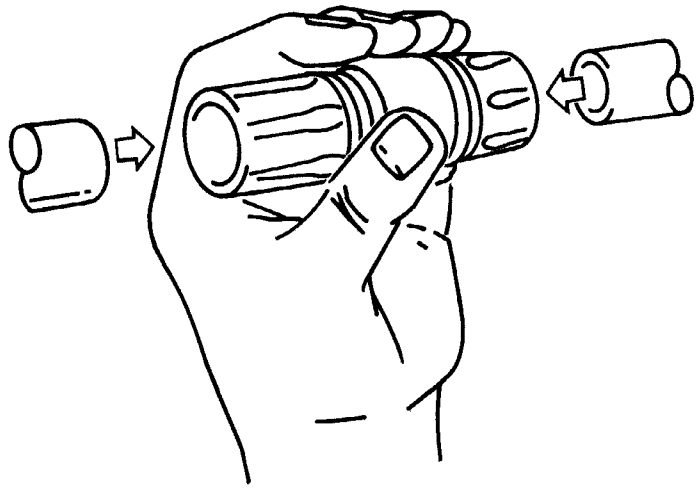
L : MINIMUM STRAIGHT TUBE LENGHT FOR SWAGING

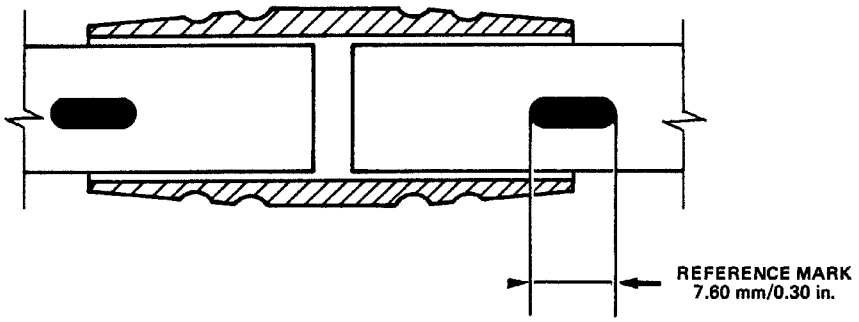
TUBE SIZES		DIMENSIONS L	
in.	mm	in.	mm
1/4	6.35	1.04	26.4
5/16	7.93	1.08	27.4
3/8	9.52	1.11	28.3
1/2	12.70	1.62	41.1
6/8	15.87	1.66	42.1
3/4	19.05	1.73	43.9
1 -	25.40	1.87	47.6
1 - 1/4	31.75	1.97	50.2
1 - 1/2	38.10	2.10	53.3

FOR SWAGING NEAR A BEND

BM5 20 23 11 0 DMM0 19

Tube Insertion Marking
Figure 017





BM5 20 23 11 0 DPMO – 18

Fitting Installation
Figure 018

(Ref. Fig. 018).
9 Apply a hydraulic pressure of 690 +17 -17 bar (10000 +250 -250 psi) to the power unit to swage the fitting.
10 Release the pressure.
11 Remove the power unit and the head assembly.
(e)Swage withthe tool series D12000 (Ref. Fig. 021).
WARNING : MAKE SURE THAT ONLY APPROVED PERSONNEL USE THIS TOOL. THIS TOOL OPERATES AT VERY HIGH PRESSURES AND CAN BE DANGEROUS.
1 Make sure that you install the dies correctly in the yoke and in the die holder assembly. You must install the tapered end of the dies on the black side of the yoke and die holder assembly.
2 Move the yoke into position on top of the fitting:
- the silver side of the yoke assembly must be nearest to the end of the fitting that you must swage,
- the silver side of the yoke must be aligned with the end of the fitting.

Push the die holder into the yoke assembly:
- the silver faces of the die holder assembly and the yoke must be on the same side,
- the silver sides of the yoke and the die holder must be aligned with the end of the fitting.

3 Install the power unit:
- install the square connector of the power unit in the swage head assembly,
- tighten the knurled nut of the power unit with your hand,
- connect the hose and coupling half-assembly of the hydraulic power supply (D12025-001) to the nipple valve of the power unit.

Make sure that:
- the end of the fitting is above the area of the insertion mark on the tube (Ref. Fig. 018),
- you can see a piece of the mark,
- the silver sides of the yoke and the die holder are aligned with the end of the fitting.

Carefully move the tool back until the end stops are approximately 0.8 mm (0.0314 in.) from the end of the fitting.
4 Make sure that the pressure relief valve of the swaging tool is set to open at 380 +17 -17 bar (5500 +250 -250 psi).
Do not pressurize too high or too low.
Operate the swaging tool with a hydraulic handpump or a hydraulic power source (push the remote air ON button). Keep the swaging tool in this position while you apply a hydraulic pressure of 380 +17 -17 bar (5500 +250 -250 psi).
Remove the swaging tool from the fitting:
- release the pressure.

NOTE : If you do not release the pressure, the dies stay closed and you cannot remove them.

- loosen the knurled nut and remove the power unit,
- remove the die holder and yoke assembly.

(8)Do a check of the tube joint.
(a)You must reject the joint if the tuble:

DLT SERIES TOOLS :

TUBE SIZE in.	SWAGE HEAD ASSEMBLY	POWER UNIT
3/16	DLT05PSHA3003	DLT05MAPW0000
1/4	DLT05PSHA3004	DLT05MAPW0000
5/16	DLT10PSHA3005	DLT10MAPW0000
3/8	DLT10PSHA3006	DLT10MAPW0000
1/2	DLT20PSHA3008	DLT20MAPW0000
5/8	DLT20PSHA3010	DLT20MAPW0000
3/4	DLT30PSHA3012	DLT30MAPW0000
1	DLT40PSHA3016	DLT40MAPW0000
1 1/4	DLT40PSHA3020	DLT40MAPW0000
1 1/2	DLT40PSHA4024A	DLT40MAPW0000

D12000 SERIES TOOLS :

TUBE SIZE in.	SWAGE TOOL ASSEMBLY	COMPONENT PARTS SWAGE TOOL ASSEMBLY	
		SWAGE HEAD ASSEMBLY	POWER UNIT
3/16	D12203	D12203-56	D12550-013
1/4	D12204	D12204-56	D12550-013
5/16	D12205	D12205-56	D12550-013
3/8	D12206	D12206-56	D12550-013
1/2	D12208	D12208-56	D12550-022
5/8	D12210	D12210-56	D12550-022
3/4	D12225-012	D12225-012-56	D12550-031
1	D12216	D12216-56	D12550-040
1 1/4	D12220	D12220-56	D12550-040
1 1/2	D12224	D12224-56	D12550-040

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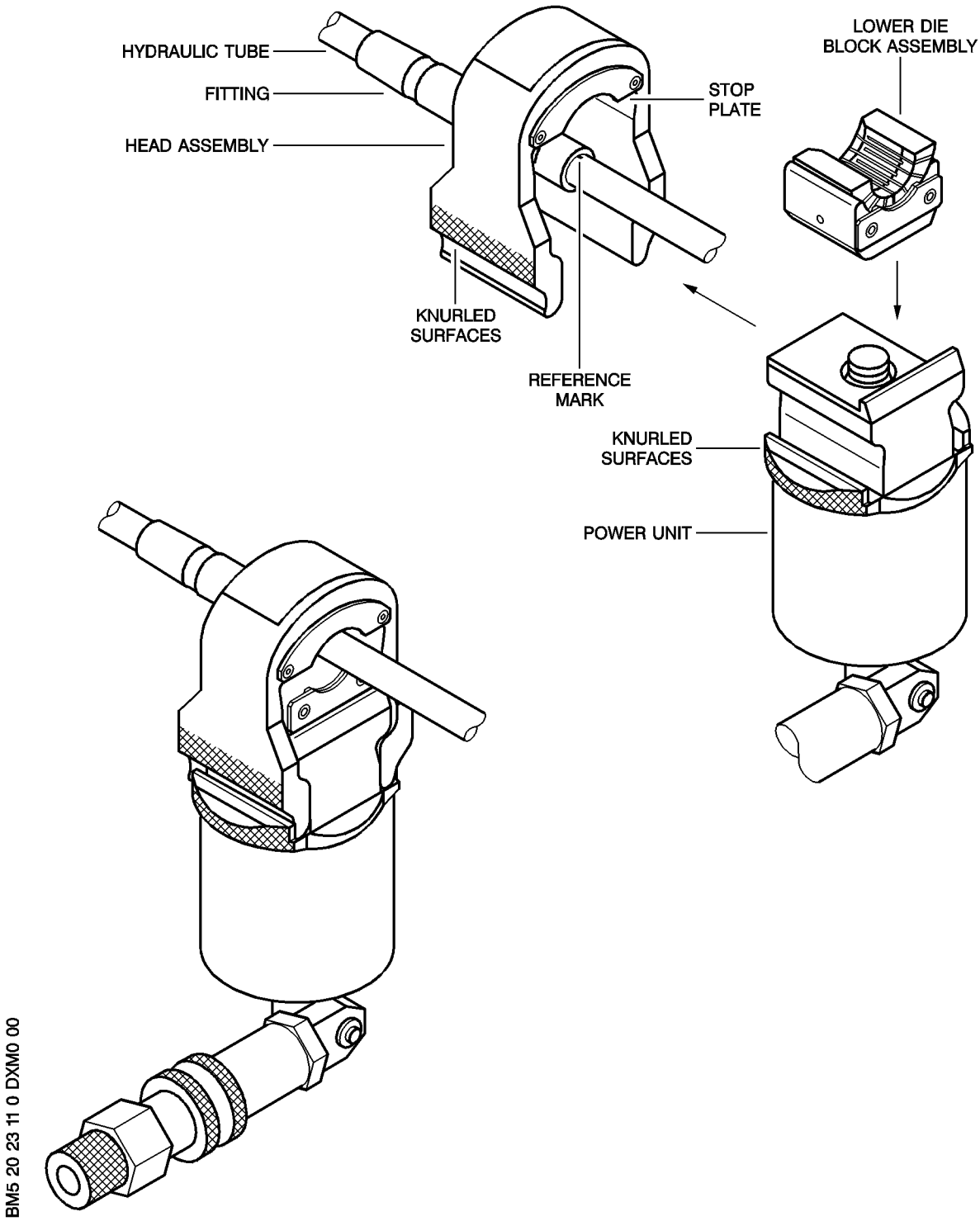
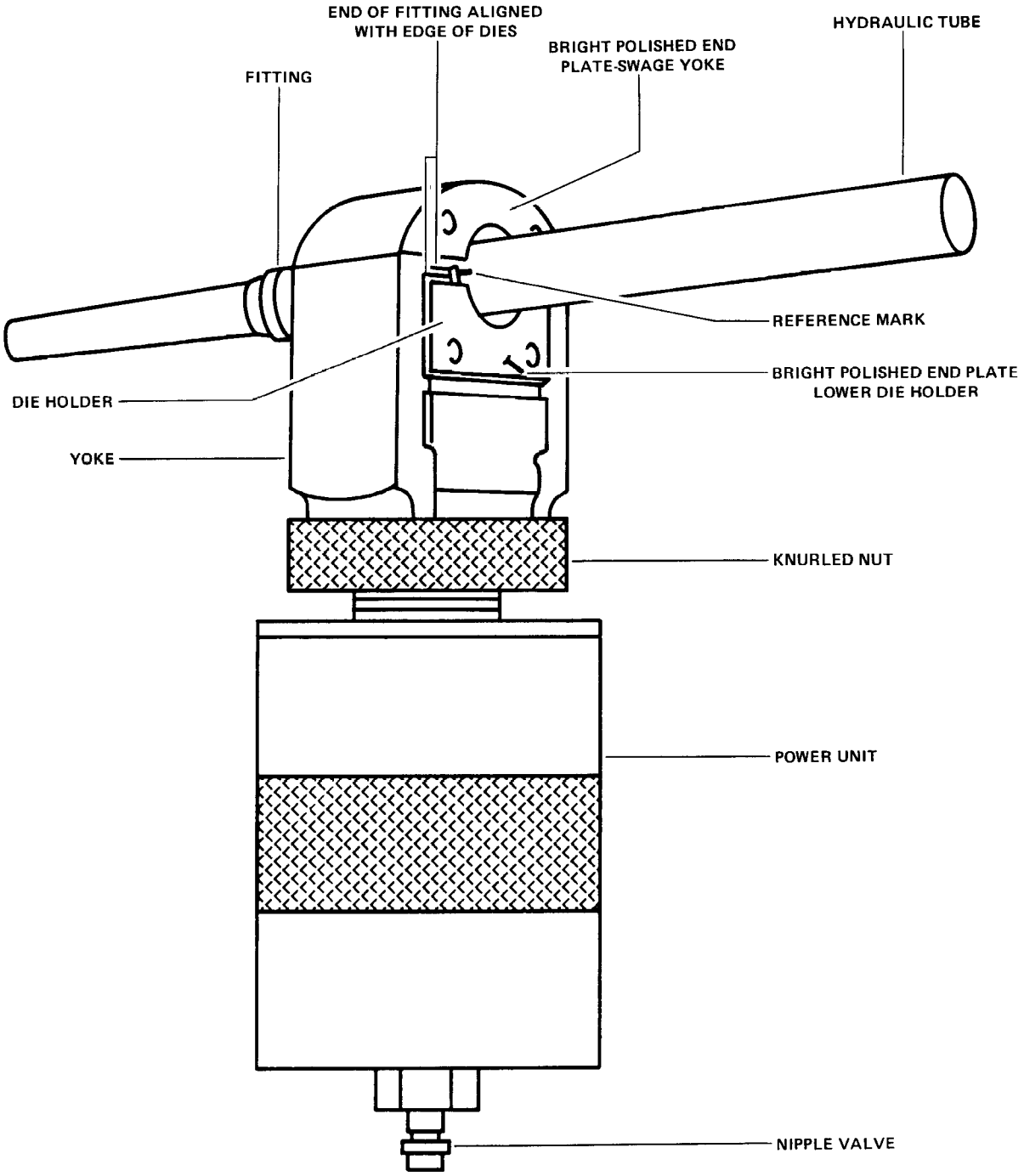
Swage Tools
Figure 019



Swaging Tool Installation (Series DLT)
Figure 020



Swaging Tool Installation (Series D12000)
Figure 021

- goes too far into the fitting,
- does not go sufficiently far into the fitting.

(b)Look at the joint:
- make sure that you can see a piece of the insertion mark.

(c)Do an inspection of the joint with the applicable inspection gage (Ref. Fig. 022, 023).
The inspection gage must:
- contain all the segments around the diameter of the fitting,
- touch the end of the fitting with its shoulder.

If the swaging is not correct, it is possible to swage the joint again, but not always.

INDICATION	POSSIBLE PROBLEM	CORRECTIVE ACTION
The fitting does not swage correctly.	The swaging pressure is out of tolerances: **FOR TOOLS SERIES DLT:** - 10000 +250 -250 psi **FOR TOOL SERIES D12000:** - 5500 +250 -250 psi	Make sure that the hydraulic power supply and connections to the tool are correct.
	The swaging head is too large.	Use the correct swaging head.
The gage does not go on top of the external diameter of the swaged fitting.	The swaging pressure is not correct.	Do the swage again.
	The gage is on top of flash marks. The dies and the walls of the yoke and the die holder must be clean.	Turn the gage away from the flash marks. Carefully remove the dies from the head and clean the dies and all parts of the head assembly.
The shoulder of the gage does not touch the end of the fitting.	You did not push the fitting sufficiently far into the swaging head.	Do the swage again.
You cannot see the insertion mark or you can see all the mark.	The insertion mark on the tube was not aligned with the end of the fitting during swaging.	Cut out the fitting.

NOTE : For all other malfunctions, refer to your **PERMASWAGE S.A.** supplier.

TUBE SIZE in.	INSPECTION GAGE
1/4	D12-9892 - 04
5/16	D12-9892 - 05
3/8	D12-9892 - 06
1/2	D12-9892 - 08
5/8	D12-9892 - 10
3/4	D12-9892 - 12
1	D12-9892 - 16
1 1/4	D12-9892 - 20
1 1/2	D12-9892 - 24

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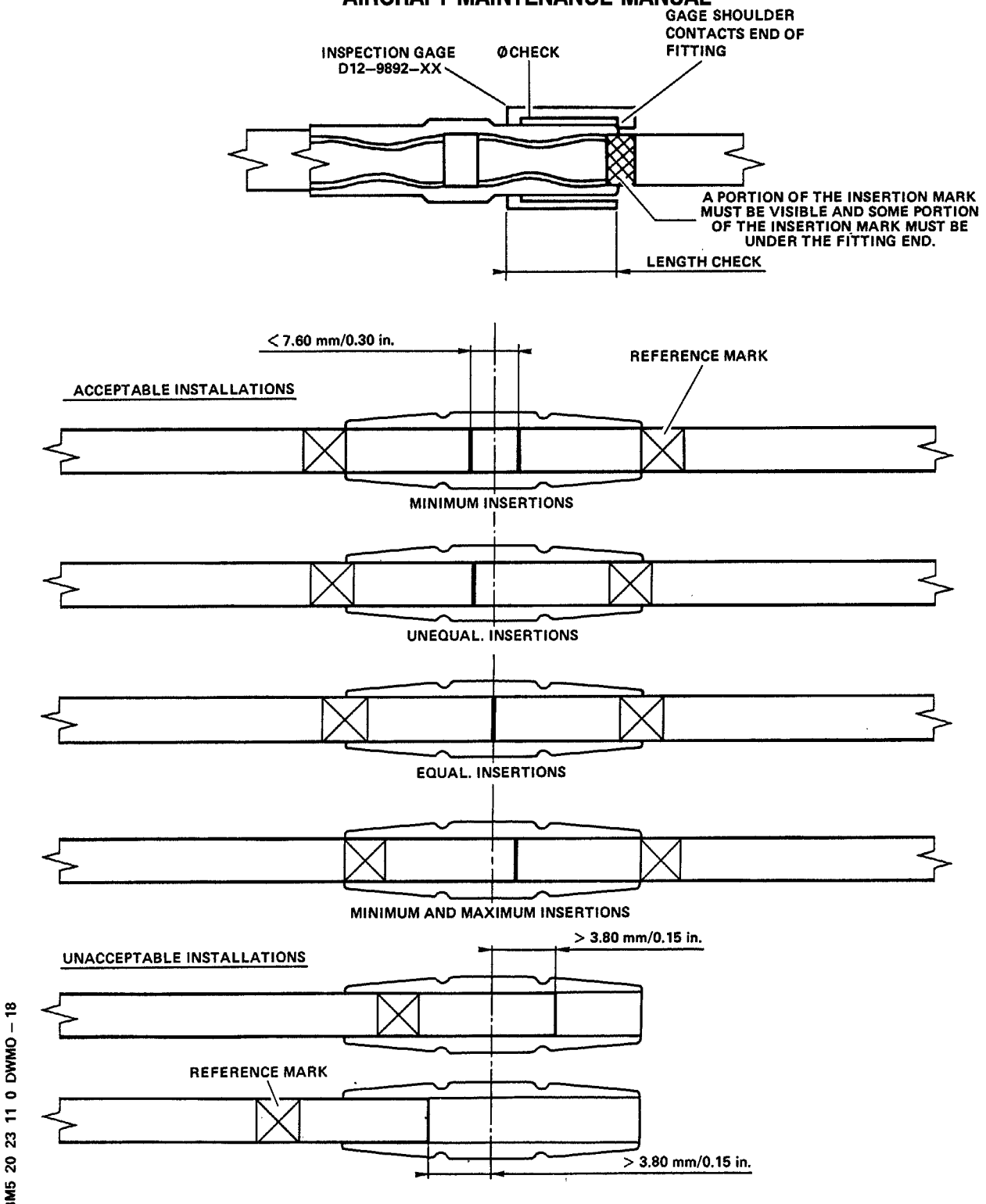
Inspection Gage
Figure 022



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Swaged Fitting Installation
Figure 023

R (9)Protection on the Repaired Tubes (if applicable).
R (a)Do the applicable bleeding procedure (Ref. 29-00-00, P. Block 401).
R (b)Pressurize the aircraft hydraulic system to nominal pressure and do a check for leaks.
R (c)Apply protection on the repaired tubes (if applicable).
R 1 For aluminum tube:
R - apply PRETREATMENT FOR PAINTING (Material No. 13-002) on the bare metal of the tube with a brush,
R - complete the protection with STRUCTURE PAINTS (Material No. 16-001C).
R 2 For CRES tube (if painted):
R - rub the bare metal with scotch-brite pad,
R - apply STRUCTURE PAINTS (Material No. 16-020) on the bare metal of the tube,
R - complete the protection with STRUCTURE PAINTS (Material No. 16-001C).

R D. Repair of the Hydraulic Tubes with HARRISON Elastomerically-Swaged Fittings
R WARNING : BE CAREFUL WHEN YOU USE CONSUMABLE MATERIALS.
R OBEY THE MATERIAL MANUFACTURER'S INSTRUCTIONS AND THE LOCAL REGULATIONS.
R MAKE SURE THAT THERE IS A GOOD FLOW OF AIR THROUGH THE WORK AREA.
R DO NOT BREATHE THE FUMES.
R DO NOT SMOKE.
R DO NOT USE THESE MATERIALS NEAR A FLAME, SPARKS OR SOURCES OF HEAT.
R USE PROTECTIVE CLOTHING, GOGGLES AND GLOVES.
R IF YOU GET ONE OF THESE MATERIALS:
R - ON YOUR SKIN OR IN YOUR EYES, FLUSH IT AWAY WITH A FLOW OF CLEAN WATER.
R - IN YOUR MOUTH, GET IMMEDIATE MEDICAL AID.
R IN GENERAL, THESE MATERIALS ARE FLAMMABLE, POISONOUS AND SKIN IRRITANTS.

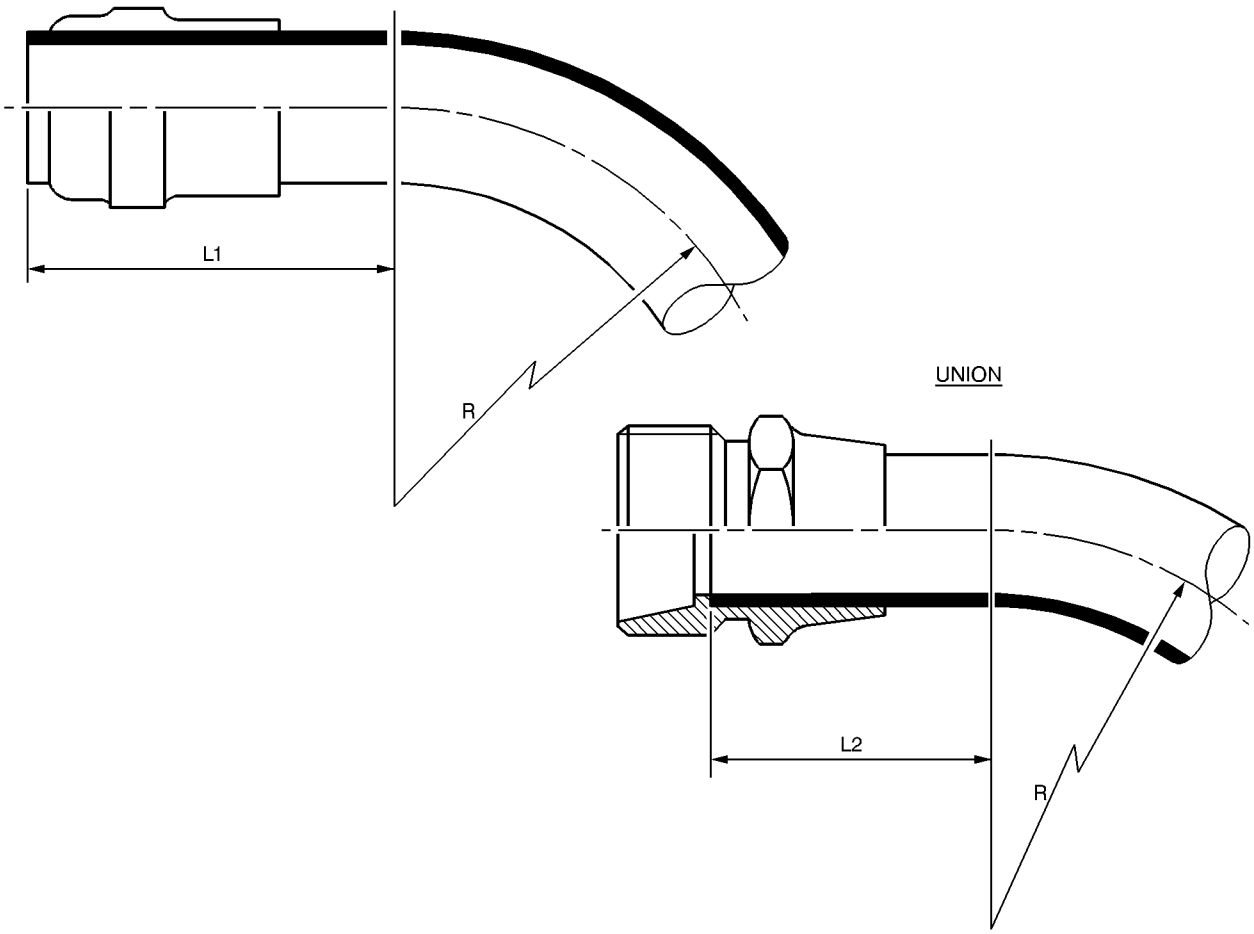
R WARNING : OBEY THE HYDRAULIC SAFETY PROCEDURES.
R WORK ON THE HYDRAULIC SYSTEMS CAN BE DANGEROUS.

R This is an approved repair procedure for hydraulic tubes.
R This procedure is applicable to:
R - Aluminum alloy (6061-T6) tubes Ref. ASNA3410, DAN40, sizes -04 to -16 and -24.
R - Corrosion-resistant steel (21-6-9) tubes Ref. ASNA3288, sizes -04 to -24.
R NOTE : This repair procedure is not applicable to:
R - hydraulic tubes in engine area,
R - hydraulic tubes in the pylon box structure and pylon forward secondary structure,
R - coiled flexible tubes,
R - hydraulic tubes installed on landing gear legs.

ITEM	DESIGNATION
(1)	Warning Notice
(2)	Brush - Bristled
(3)	Cap - Blanking
(4)	Cloth - Emery (Grade 400)
(5)	Cloth - Emery (Grade 240)
(6)	Cutter - Roller Type, Chipless
(7)	Torque Wrench : range 0.20 to 3.60 m.daN (2.00 to 26.00 lbf.ft)
(8)Material No. 02-003	Hydraulic Fluids (Ref. 20-31-00)
(9)Material No. 03-001	Oils
10)Material No. 04-012	Common Grease (Ref. 20-31-00)
11)Material No. 08-009B	Bonding and Adhesive Compounds (Ref. 20-31-00)
12)Material No. 08-009D	Bonding and Adhesive Compounds (Ref. 20-31-00)
13)Material No. 08-024	Bonding and Adhesive Compounds (Ref. 20-31-00)
14)Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
15)Material No. 11-026B	Cleaning Agents (Ref. 20-31-00)
16)Material No. 13-002	Pretreatment for Painting (Ref. 20-31-00)
17)Material No. 16-001C	Structure Paints (Ref. 20-31-00)
18)Material No. 19-003	Miscellaneous (Ref. 20-31-00)
Referenced Procedure	
- 12-12-29, P. Block 1	Hydraulics
- 20-21-12, P. Block 1	Tightening Torques of Standard Threaded Fasteners
- 29-00-00, P. Block 1	General - Description and Operation
- 29-00-00, P. Block 401	General - Removal/Installation
- 29-10-00, P. Block 301	Main - Servicing
- 32-42-00, P. Block 301	Normal Braking - Servicing
- 32-43-00, P. Block 301	Alternate Braking with Anti-skid - Servicing

(1)Safety precautions.
  (a)You must obey the hydraulic safety procedures when you do work on the hydraulic system (Ref. 29-00-00, P. Block 1).
  (b)Put a **WARNING NOTICE** in position in the cockpit to tell persons not to operate the hydraulic systems.
(2)Aircraft maintenance configuration.
  (a)Make sure that the hydraulic systems are depressurized.
(3)Selection of the repair procedure.
  (a)Remove the damaged tube from the aircraft.
  (b)Make sure that the length of straight tube after a bend is the minimum necessary for the swaging operation (Ref. Fig. 024).
  (c)Measure the length of the defect (Ref. Fig. 025).
    1 Use the single-assembly repair procedure if the length of the defect is less than F.
    2 Use an assembly with one AS21902 union and two sleeves if:
      - the length of the defect is more than F,
      - the defect is in a bend,
      - the defect is at a distance of less than the minimum values from the end of the bend.

R (d)Repair procedures without AS21902 union.
R 1 Single-assembly repair procedure.
R a Remove (cut out) the damaged part of the tube.
R You must remove a length F of tube.
R b Replace the removed part of the tube with:
R - an NSA855010 union,
R - an NSA855034 sleeve,
R - an MS21921 or AS21921 or ASNA3769 nut.
R (e)Repair procedures with AS21902 union.
R 1 Assembly with the repair procedure with one AS21902 union and two sleeves.
R a Remove (cut out) the damaged part of the tube.
R b Replace the removed part of the tube with:
R - an AS21902 union,
R - two NSA855034 sleeves,
R - two MS21921 or AS21921 or ASNA3769 nuts.
R (4)Selection of tooling, unions and sleeves.
R (a)Get the applicable tools (Ref. Fig. 026, 031, 037).
R NOTE : This repair procedure uses a tube-expansion swaging procedure with an elastomeric expander.
R 1 Get the applicable tool head:
R - for tube sizes -04 to -08, use small tool head (5175),
R - for tube sizes -10 to -24, use large tool head (5720).
R 2 Get the applicable components (drawbolt, expander, split ring, bushing, anti-extrusion ring and back-up ring) of the internal tool for unions (Ref. Fig. 034).
R 3 Get the applicable components (drawbolt, expander, split ring, bushing, anti-extrusion ring and back-up ring) of the internal tool for sleeves (Ref. Fig. 035).
R 4 Get the applicable components (jaws, anvil, retainer and adapter) of the external tool (Ref. Fig. 036).
R (b)Get the applicable union, sleeve and nut (***AKF0//***).
R (5)Cutting the damaged part of the tube.
R (a)Get the applicable CUTTER-ROLLER TYPE, CHIPLESS (Permaswage):
R - for tube sizes -04 and -06, use P/N D12530-001,
R - for tube sizes -08 to -12, use P/N D12531-001,
R - for tube sizes -16 to -24, use P/N D12532-001.
R (b)Put the tube cutter in the correct position on the tube (Ref. Fig. 027).
R 1 Install the tube cutter on the tube.
R 2 Make the tube touch the two rollers of the tube cutter.
R 3 Tighten the drive screw until the cutter wheel lightly touches the tube.
R (c)Give the drive screw a 1/16 to 1/8 turn.
R (d)Turn the ratchet handle through the arc of clearance until the wheel does one or two turns.
R (e)Make sure that the wheel makes only one groove:
R - if the wheel makes only one groove, do steps (b) and (c) again to cut the tube,
R - if the wheel makes more than one groove (thread) on the tube, remove the tube cutter. Do the procedure again from step (a) on a new area



TUBE SIZE	TUBE DIA.		R = 3 x DIA.							
			L1 MIN.				L2 MIN.			
			SHORT SWAGE		LONG SWAGE		SHORT SWAGE		LONG SWAGE	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
-04	6.35	1/4	23.87	0.94	33.02	1.30	23.87	0.94	30.98	1.22
-05	7.94	5/16	24.89	0.98	33.02	1.30	24.89	0.98	30.98	1.22
-06	9.52	3/8	25.90	1.02	34.03	1.34	25.90	1.02	32.00	1.26
-08	12.70	1/2	26.92	1.06	38.10	1.50	26.92	1.06	35.05	1.38
-10	15.87	5/8	28.95	1.14	40.89	1.61	28.95	1.14	36.83	1.45
-12	19.05	3/4	29.97	1.18	40.89	1.61	29.97	1.18	38.10	1.50
-16	25.4	1	29.97	1.18	42.92	1.69	29.97	1.18	38.10	1.50
-20	31.75	11/4	26.92	1.06	47.00	1.85	26.92	1.06	38.10	1.50
-24	38.1	11/2	30.98	1.22	47.00	1.85	30.98	1.22	43.94	1.73

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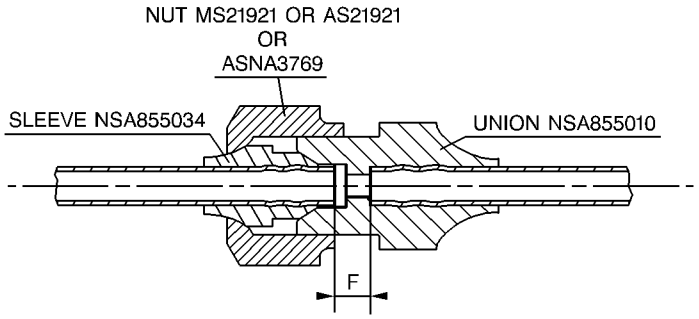
Minimum Length of Straight Tube for Swaging
Figure 024

R

DEFECT LENGTH

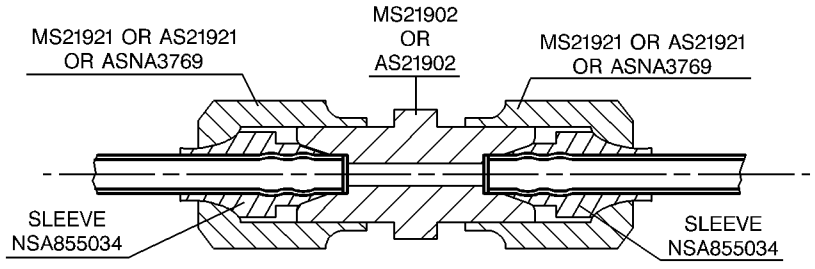
CUTTING OUT THE DEFECT



THE DIMENSION F IS GIVEN IN THIS TABLE:

TUBE SIZE	TUBE DIA.		DIMENSION F	
	mm	in.	mm	in.
-04	6.35	1/4	2.0	0.078
-05	7.94	5/16	1.5	0.059
-06	9.52	3/8		
-08	12.70	1/2	2.0	0.078
-10	15.87	5/8	2.5	0.098
-12	19.05	3/4	3.0	0.118
-16	25.40	1		
-20	31.75	11/4		
-24	38.10	11/2	2.0	0.078

WHEN THE DAMAGE LENGTH IS MORE THAN DIMENSION F, YOU CAN USE THIS INSTALLATION:



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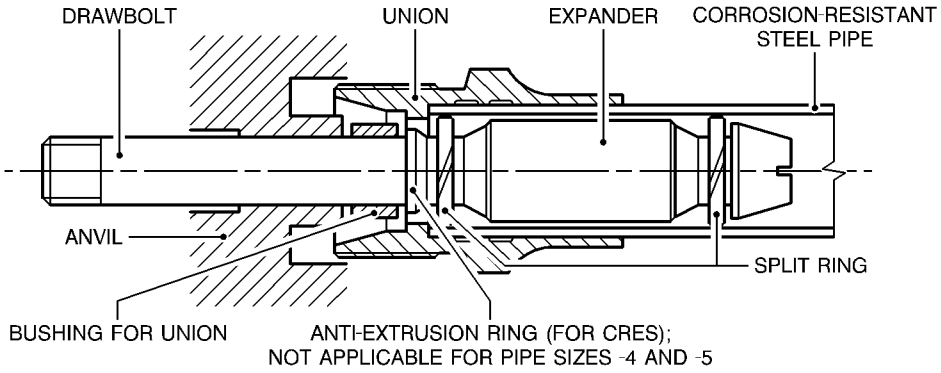
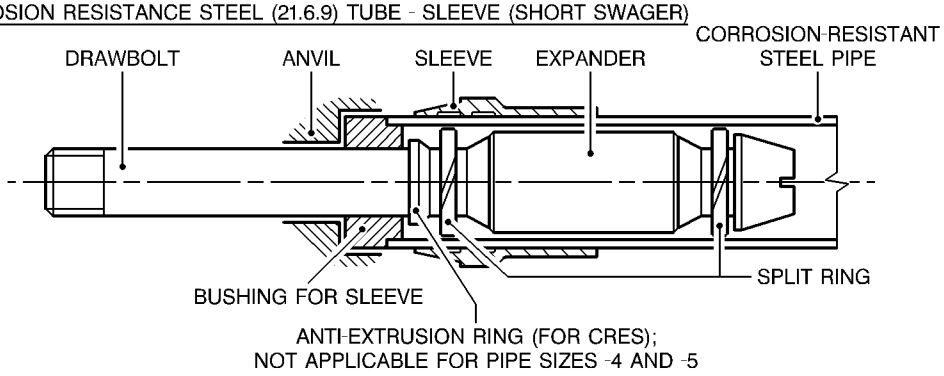
R

Repair Set-up
Figure 025

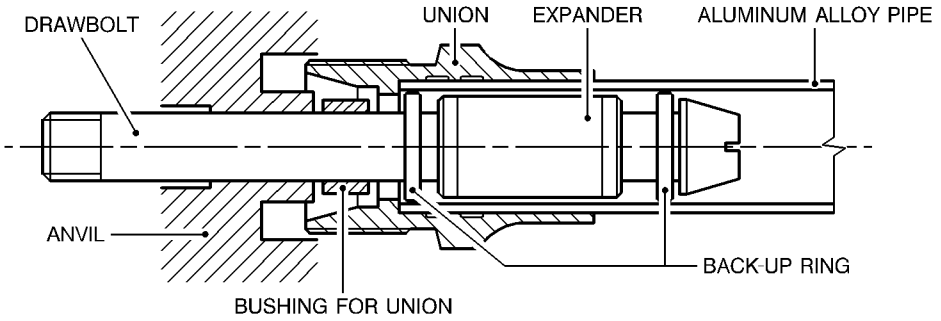
CORROSION RESISTANCE STEEL (21.6.9) TUBE - UNION (LONG SWAGER)



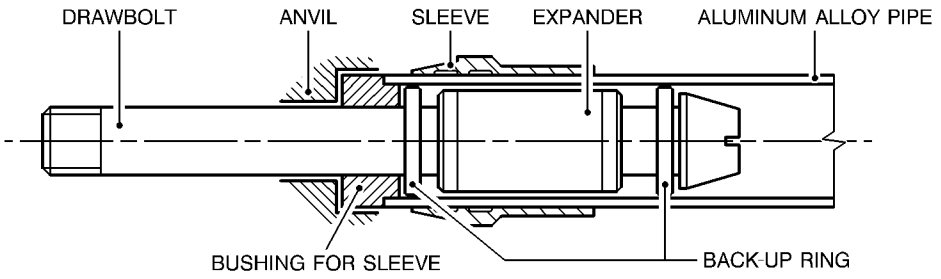
CORROSION RESISTANCE STEEL (21.6.9) TUBE - SLEEVE (SHORT SWAGER)



ALUMINUM ALLOY (6061-T6) TUBE - UNION (LONG SWAGER)



ALUMINUM ALLOY (6061-T6) TUBE - SLEEVE (SHORT SWAGER)



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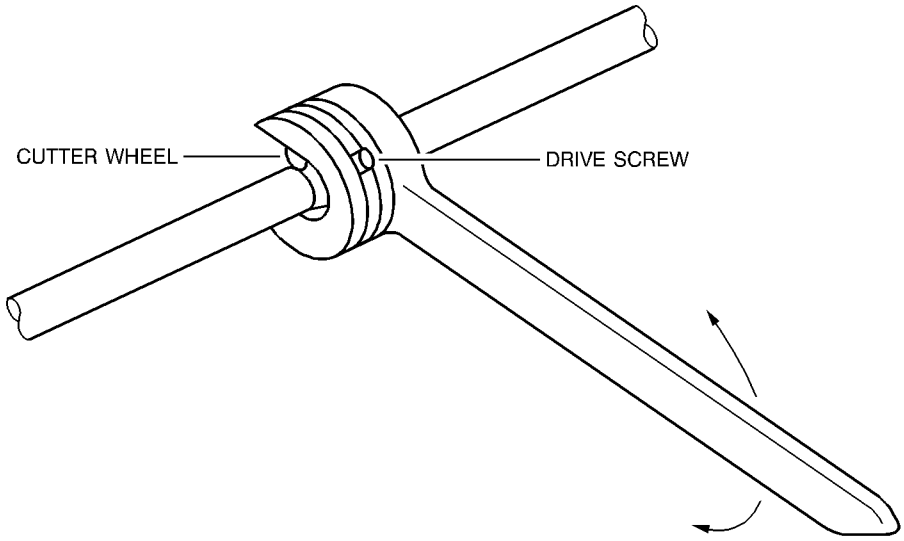
Internal Swaging Tooling
Figure 026

R



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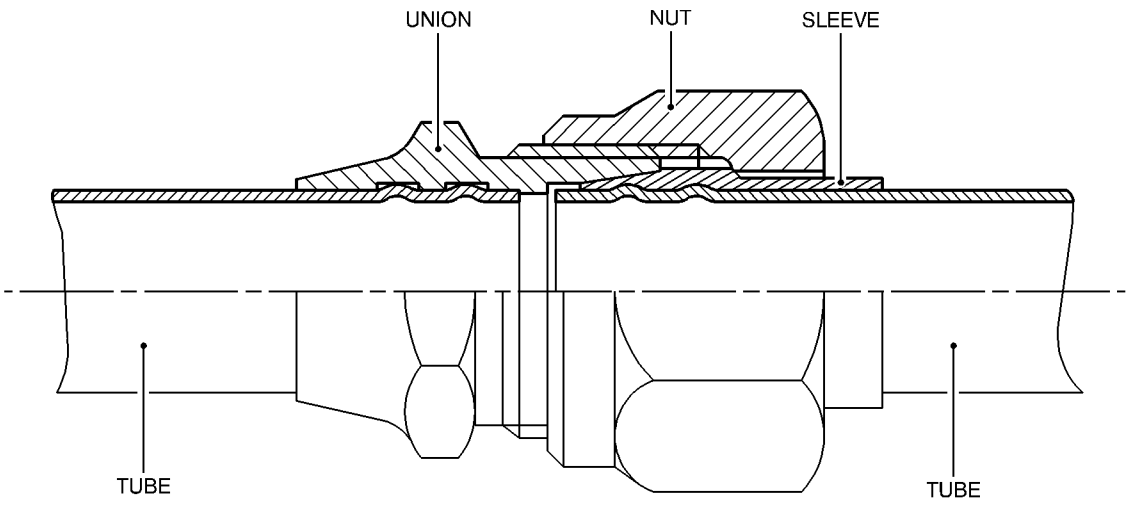
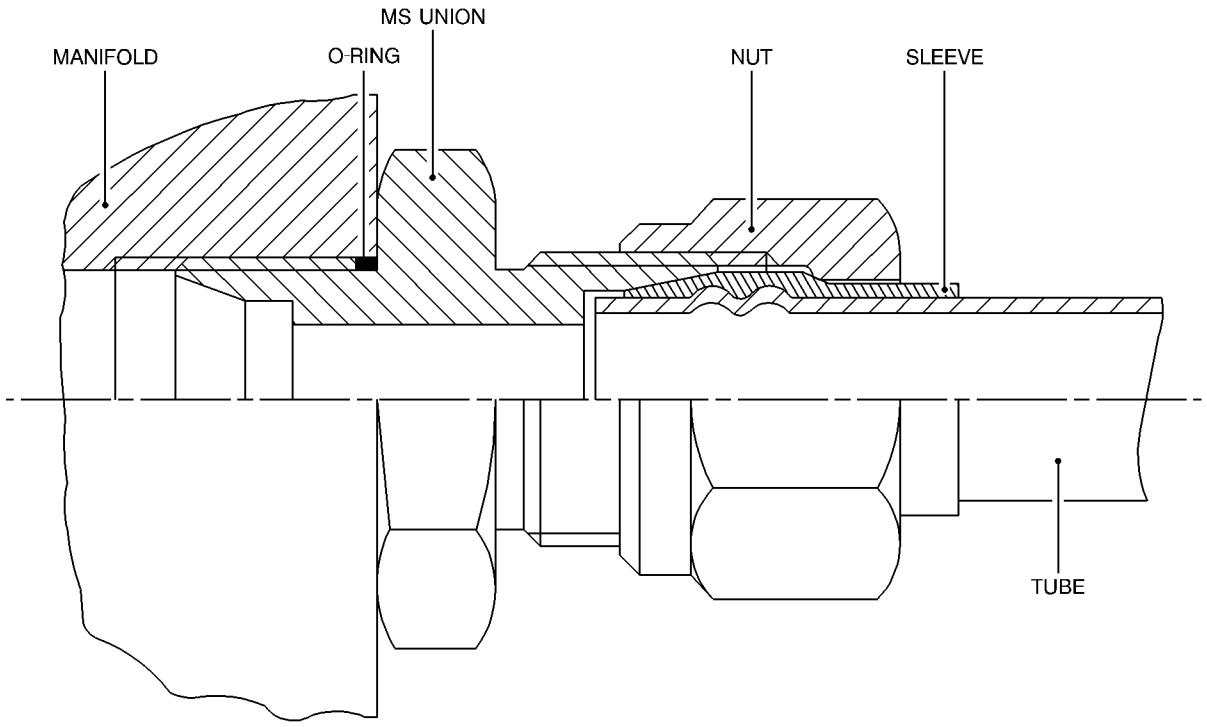
Tube Cutter
Figure 027

R

R of the tube to remove the thread.
R (f)Cut the tube slowly and smoothly to make sure that the shape of the end of the tube does not change.
R (g)Regularly lubricate the ratchet, the rollers and the cutter wheel with Material No. 03-001 for easy operation.
R NOTE : After you do steps (b) and (c) two or three times, you can give the drive screw a 1/8 to 1/4 turn in step (c) to let you do the procedure more quickly.
R (6)Preparation for tubing repair (Ref. Fig. 029).
R (a)Remove the paint at the tube ends.
R 1 Remove the paint along a minimum length (J MIN) of tube with a CLOTH-EMERY (GRADE 400).
R 2 Make sure that you do not cause scratches on the tube when you remove the paint.
R (b)Deburr the internal diameter (Ref. Fig. 030).
R 1 Make sure that the internal deburring tool is clean. Lubricate it with Material No. 02-003.
R 2 Hold the tube.
R 3 Push in the plunger of the internal deburring tool.
R 4 Put the stem into the end of the tube.
R 5 Release the plunger to let the stem expand and seal the tube.
R 6 Apply a light pressure on the cutter and at the same time turn the knurled body.
R 7 Continue to turn the knurled body until the internal diameter of the tube is deburred.
R 8 Do not push the plunger in, but carefully and slowly pull the deburring tool from the tube until you can see the first ridge of the stem.
R 9 Make sure that the tube is correctly deburred:
R - if the end of the tube is not correctly deburred, do step 3 to step 8 again,
R - if the end of the tube is correctly deburred, pull the tool out of the tube.
R 10 Fully clean the stem and the end of the tube with a lint-free cotton cloth Material No. 19-003 made moist with Material No. 11-003 and dry it immediately.
R (c)Deburr the external diameter.
R 1 Remove the burrs on the external diameter of the tube with CLOTH-EMERY (GRADE 240).
R The tube must not have external burrs.
R 2 Blow air through the tube to remove contamination.
R 3 Clean the end of the tube with a lint-free cotton cloth Material No. 19-003 made moist with Material No. 11-003. The surface must be clean and without damage.
R 4 The tube must go freely into the fitting. If the tube does not go freely into the fitting, do not install the fitting.
R (7)Preparation of the swage tools (Ref. Fig. 031, 037).
R (a)Engage and tighten the adapter in the tool head.
R (b)Engage the anvil on the top of the tool head then tighten the attach nut.
R (c)Install the internal tool components on the drawbolt:

R 1 Make sure that the split ring (or back-up ring) agrees with the tube ID.
R NOTE : You must not use a split ring (or back-up ring) with an Outer Diameter (OD) immediately smaller than the tube Inner Diameter (ID). If you do, it will not be easy to remove the tube after the swaging operation.
R 2 Install the split ring (or back-up ring), the expander and the bushing (union or sleeve) on the drawbolt.
R NOTE : The inner chamfers of the split ring (or back-up ring) must point away from the expander.
R NOTE : The shoulder of the sleeve bushing must point to the drawbolt to be against the tube end.
R (d)Install the drawbolt on the adapter then tighten it with your hand.
R (e)Connect the hose between the pump and the swager of the swage machine.
R (Ref. Fig. 028)
R (8)Installation of the sleeve or the union on the tube.
R (a)If applicable, engage the nut on the tube.
R (b)Install the union or the sleeve on the tube end:
R 1 If bonding is not necessary, engage the union or the sleeve on the tube end.
R 2 If bonding of the union or the sleeve on the tube is necessary:
R NOTE : If you bond the union or the sleeve on the tube, the time between the installation and the swaging must not be more than 15 minutes.
R a Clean the union or the sleeve with a lint-free cotton cloth Material No. 19-003 made moist with Material No. 11-026B.
R b Put CAP - BLANKING on the tube ends.
R c Apply Material No. 08-009B or Material No. 08-009D on the swaging area of the tube and on the inner side of the union or the sleeve.
R d Let it dry:
R - From 4 to 6 minutes if you used Material No. 08-009B.
R - For 10 minutes if you used Material No. 08-009D.
R e Apply Material No. 08-024 on the tube end.
R f Install the union or the sleeve on the tube end.
R Lightly turn the union or the sleeve when you engage it on the tube to equally apply Material No. 08-024.
R g Use a lint-free cotton cloth Material No. 19-003 to remove the unwanted material.
R h Remove CAP - BLANKING from the tube ends.
R (9)Swaging of the union or the sleeve on the tube.
R (a)Apply a thin layer of Material No. 04-012 on the expander.
R (b)Put the tube assembly (with the union or the sleeve) on the drawbolt.
R Make sure that the tube assembly is against the anvil.
R (c)Install the two jaws on the anvil.
R (d)Install the retainer on the jaws.
R (e)If you do work on size -10 to size -24 tubes:
R - Install the retainer bolts on the retainers.
R - Tighten the retainer bolts with your hand.
R Be careful not to cross-thread the retainer bolts.
R - TORQUE the retainer bolts to 3 m.daN (22.12 lbf.ft).
R (f)On the pump, tighten the valve installed on the right side of the





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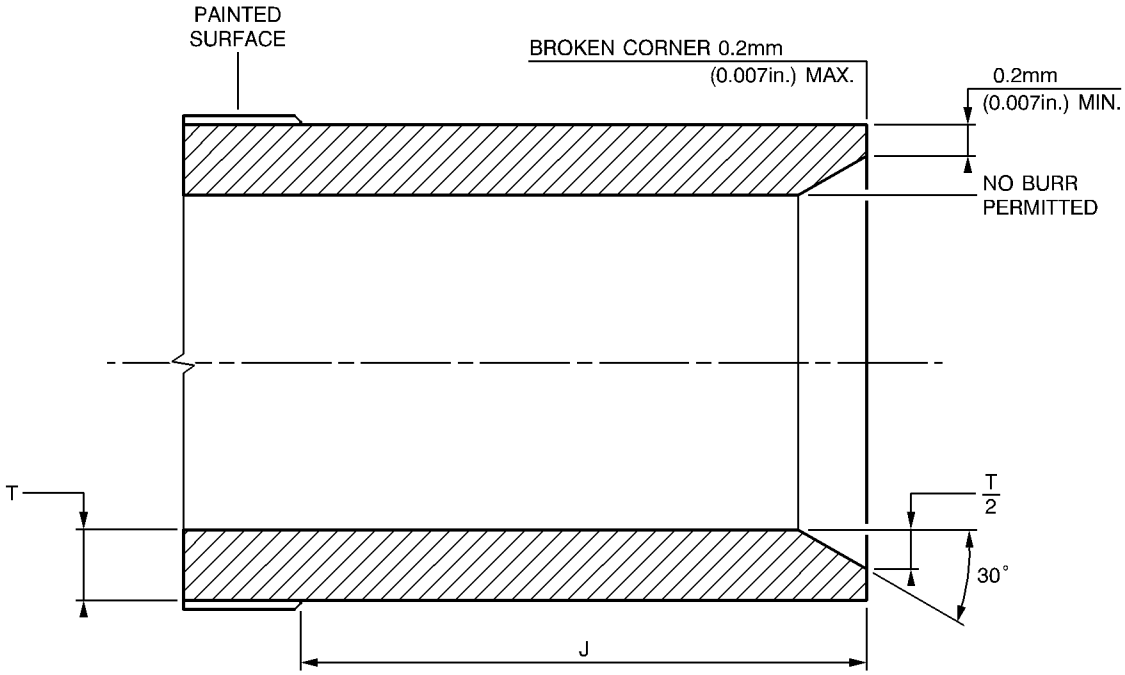
Sleeves and Unions
Figure 028

R



TUBE SIZE	TUBE DIA.		J MIN.	
	mm	in.	mm	in.
-04	6.35	1/4	14	0.55
-05	7.94	5/16	16	0.63
-06	9.52	3/8	17	0.67
-08	12.70	1/2	20	0.79
-10	15.87	5/8	22	0.86
-12	19.05	3/4	20	0.79
-16	25.40	1	19	0.75
-20	31.75	11/4	21	0.83
-24	38.10	11/2	25	0.98

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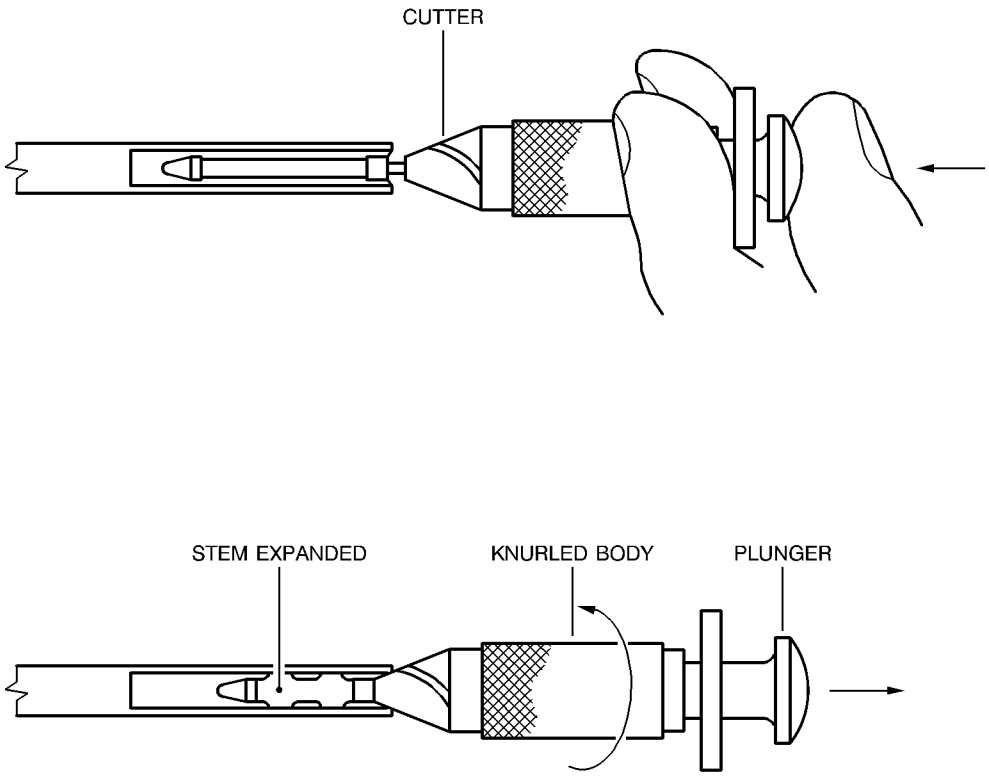
R

Tube end Dimension
Figure 029



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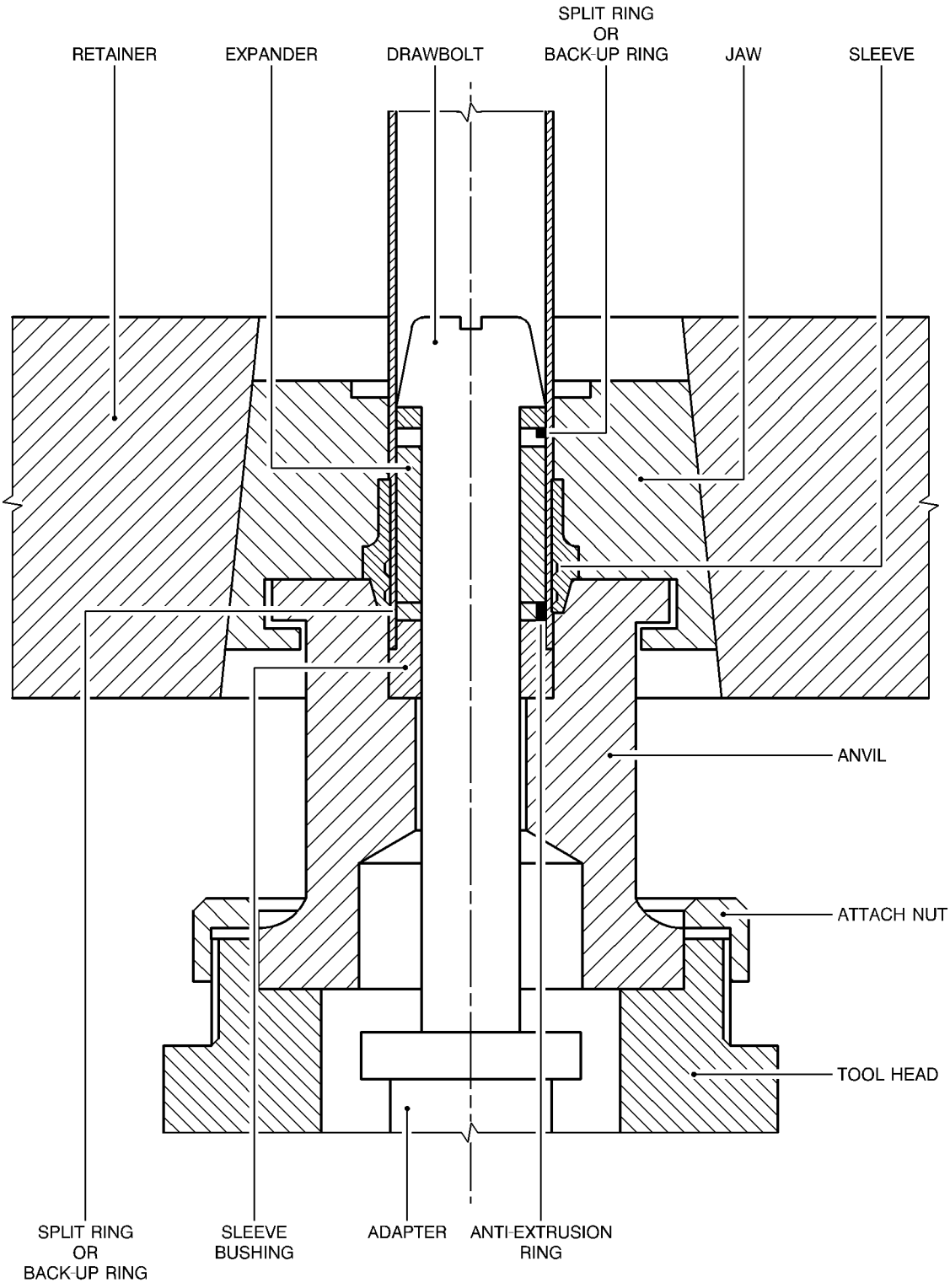
Internal Deburring Tool
Figure 030

R



Tool Assembly for Sleeve
Figure 031

R

R gage.
R (g)Slowly operate the pump until you get the specified value
R (Ref. Fig. 032, 033).
R (h)On the pump, loosen the valve to release the pressure.
R (j)If applicable, loosen and remove the retainer bolts from the retainer.
R (k)Remove the retainer and the two jaws from the anvil.
R (l)Remove the tube assembly from the drawbolt.
R (m)Clean the tube with a lint-free cotton cloth Material No. 19-003 made
R moist with Material No. 11-026B.
R (10)Inspection of the swaged union or sleeve.
R (a)Do a check of the tube for damage.
R (b)If you find damage, make sure that it is in the limits (Ref. 20-23-11,
R P. Block 1).
R (c)Measure the deformations of the tube after swaging
R (Ref. Fig. 038, 039).
R 1 Tube protrusion out of the sleeve.
R a Measure the tube protrusion B out of the sleeve.
R b Make sure that the tube protrusion B is in the limits.
R c If necessary, cut the tube end to decrease the tube.
R NOTE : You must not decrease the tube protrusion to less than
R 0.5 mm (0.0196 in.).
R 2 Deformations of the tube, sleeve and union.
R a Measure the diameters D1 and D2 and calculate the wave deformation
R 2A (with 2A=D1-D2).
R NOTE : Measure D1 only at the second groove.
R NOTE : To measure D2, you must use the smallest diameter in the
R reference area.
R b Make sure that the wave deformation 2A is in the limits.
R c Measure the diameter D3.
R d Make sure that the diameter D3 is in the limits.
R (d)Reject the assembly if:
R - The diameter D3 is more than the maximum tolerance.
R - The wave deformation 2A is more than the maximum tolerance.
R - The tube protrusion B is less than the minimum tolerance.
R (e)If the wave deformation 2A is less than the minimum tolerance, do
R step (9) again.
R NOTE : To swage again, you can increase the swaging pressure by 5%.
R NOTE : If the sleeve or the union is bonded to the tube, there must
R be less than 30 minutes between the two swaging operations.
R NOTE : You can do the swaging operation again one time.
R (11)Protection of the tubes.
R Apply Material No. 13-002 on the bare metal with a BRUSH - BRISTLED.
R Complete the protection with Material No. 16-001C.
R (12)Pressure test of the repaired tube.
R 1 Install the repaired tube on the aircraft (Ref. 20-23-11, P. Block 1).
R 2 Connect the union and sleeve (Ref. 20-21-12, P. Block 1).
R 3 Pressurize the hydraulic reservoirs (Ref. 29-14-00, P. Block 301).
R 4 If necessary, fill the hydraulic reservoirs (Ref. 12-12-29, P. Block 1).
R 5 Pressurize the hydraulic systems (Ref. 29-10-00, P. Block 301).
R 6 Do a check for leaks.
R 7 Bleed the related hydraulic system:

LONG AND SHORT SWAGE

CORROSION RESISTANCE STEEL (21.6.9) TUBES										
TUBE SIZE	TUBE DIA.		TUBE WALL THICKNESS		SWAGING PRESSURE +/-5%				MAXIMUM SAFE PRESSURE	
					5175 & 5175E		5720 & 5720E			
	mm	in.	mm	in.	mpa	PSI	mpa	PSI	mpa	PSI
-04	6.35	1/4	0.41	0.016	2.7	385	NA		4	580
-05	7.94	5/16	0.51	0.02	5.9	860			7.2	1050
-06	9.52	3/8	0.51	0.02	8.3	1200			13.1	1900
-08	12.70	1/2	0.66	0.026	13.4	1950			18.6	2700
-10	15.87	5/8	0.84	0.033	NA		6.4	930	11.4	1650
-12	19.05	3/4	0.99	0.039			9.9	1430	17.2	2500
-16	25.4	1	1.32	0.052			19.7	2850	34.5	5000
-20	31.75	11/4	0.61	0.024			11	1600	44.8	6500
-24	38.1	11/2	0.61	0.024			27.6	4000	48.3	7000

ALUMINUM ALLOY (6061-T6) TUBES										
TUBE SIZE	TUBE DIA.		TUBE WALL THICKNESS		SWAGING PRESSURE +/-5%				MAXIMUM SAFE PRESSURE	
					5175 & 5175E		5720 & 5720E			
	mm	in.	mm	in.	mpa	PSI	mpa	PSI	mpa	PSI
-04	6.35	1/4	0.89	0.035	1.5	220	NA		4	580
-05	7.94	5/16	0.56	0.022	1.8	260			7.2	1050
			0.89	0.035	2.2	320				
-06	9.52	3/8	0.71	0.028	3.1	450			13.1	1900
			0.89	0.035	3.9	570				
-08	12.70	1/2	0.71	0.028	3.4	500			18.6	2700
			0.89	0.035	4.6	670				
-10	15.87	5/8	0.89	0.035	NA		1.7	250	11.4	1650
-12	19.05	3/4	0.89	0.035			2.6	380	17.2	2500
-16	25.4	1	1.22	0.048			6.1	880	34.5	5000
-20	31.75	11/4	0.89	0.035			6.9	1000	44.8	6500
-24	38.1	11/2	0.89	0.035			9.7	1400	48.3	7000

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Swaging Pressure for NSA855010
Figure 032

R

HAND SWAGER MODELS 5175 & 5175E AND 5720 FOR NSA855034 - SWAGING PRESSURE

LONG AND SHORT SWAGE

CORROSION RESISTANCE STEEL (21.6.9) TUBES										
TUBE SIZE	TUBE DIA.		TUBE WALL THICKNESS		SWAGING PRESSURE +/-5%				MAXIMUM SAFE PRESSURE	
					5175 & 5175E		5720 & 5720E			
	mm	in.	mm	in.	mpa	PSI	mpa	PSI	mpa	PSI
-04	6.35	1/4	0.41	0.016	3.3	475	NA		4	580
-05	7.94	5/16	0.51	0.02	6.9	1000			7.2	1050
-06	9.52	3/8	0.51	0.02	7.9	1150			13.1	1900
-08	12.70	1/2	0.66	0.026	13.8	2000			18.6	2700
-10	15.87	5/8	0.84	0.033	NA		5.9	850	11.4	1650
-12	19.05	3/4	0.99	0.039			11	1600	17.2	2500
-16	25.4	1	1.32	0.052			21	3050	34.5	5000
-20	31.75	11/4	0.61	0.024			12.4	1800	44.8	6500
-24	38.1	11/2	0.61	0.024			17.2	2500	48.3	7000

ALUMINUM ALLOY (6061-T6) TUBES										
TUBE SIZE	TUBE DIA.		TUBE WALL THICKNESS		SWAGING PRESSURE +/-5%				MAXIMUM SAFE PRESSURE	
					5175 & 5175E		5720 & 5720E			
	mm	in.	mm	in.	mpa	PSI	mpa	PSI	mpa	PSI
-04	6.35	1/4	0.89	0.035	2.6	380	NA		4	580
-05	7.94	5/16	0.56	0.022	1.6	230			7.2	1050
			0.89	0.035	3.1	450				
-06	9.52	3/8	0.71	0.028	3.1	450			13.1	1900
			0.89	0.035	3.4	500				
-08	12.70	1/2	0.71	0.028	4.5	650			18.6	2700
			0.89	0.035	6.5	950				
-10	15.87	5/8	0.89	0.035	NA		2.6	375	11.4	1650
-12	19.05	3/4	0.89	0.035			4.1	600	17.2	2500
-16	25.4	1	1.22	0.048			6.6	950	34.5	5000
-20	31.75	11/4	0.89	0.035			7.6	1100	44.8	6500
-24	38.1	11/2	0.89	0.035			9	1300	48.3	7000

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Swaging Pressure for NSA855034
Figure 033

R a Bleed general hydraulic system (Ref. 29-00-00, P. Block 401).
R b Bleed normal braking system (Ref. 32-42-00, P. Block 301).
R c Bleed alternate braking system (Ref. 32-43-00, P. Block 301).
R (13)Put the aircraft back to its initial configuration.
R 1 Make sure that the work area is clean and clear of tool(s) and other items.

E. Repair Using SIERRACIN/HARRISON H-Fittings

R To repair hydraulic tubes made of corrosion-resistant steel (21-6-9) or aluminum alloy (6061T6).
R This procedure is applicable to:
R - Corrosion-resistant steel (21-6-9) tubes Ref. ASNA3288, sizes -04 to -24.
R - Aluminum alloy (6061-T6) tubes Ref. ASNA3410, DAN40, sizes -04 to -16 and -24.
R NOTE : This repair procedure is not applicable to:
R - hydraulic tubes in engine area,
R - hydraulic tubes in the pylon box structure and pylon forward secondary structure,
R - coiled flexible tubes,
R - hydraulic tubes installed on landing gear legs.

R

ITEM	DESIGNATION
(1)	Clean Cloth
(2)	Cloth - Emery (Grade 400)
(3)	Cloth - Emery (Grade 240)
(4)Material No. 02-003	Hydraulic Fluids (Ref. 20-31-00)
(5)Material No. 03-001	Oils
(6)Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
Referenced Procedure	
- 29-00-00, P. Block 401	General - Removal/Installation

R (1)General
R (a)The H-fitting is approved for the permanent repair of middle-line tubes when:
R - the applicable swaging equipment or other special tools are not available,
R - the repair must be immediate (this repair procedure is faster than other repair procedures).
R (b)The repair of tube assemblies with H-fittings is permanent for design operating pressures up to 3000 psi (206.8427 bar) in:
R - corrosion-resistant steel tubes (21-6-9), O.D.: 6.35 mm (0.2500 in.), 9.52 mm (0.3748 in.), 12.7 mm (0.5000 in.), 15.87 mm (0.6248 in.), 19.05 mm (0.7500 in.), 25.4 mm (1.0000 in.),
R - light alloy tubes (6061T6), O.D.: 6.35 mm (0.2500 in.), 9.52 mm (0.3748 in.), 12.7 mm (0.5000 in.), 15.87 mm (0.6248 in.).
R (c)Four usual repair procedures give a solution for most repairs (Ref. Fig. 040).
R (2)Tube repair procedure.
R (a)Use the applicable fitting (refer to the H-fitting Dimension and Part Number Table) (Ref. Fig. 041).

INTERNAL TOOLING - UNIONS
(SHORT AND LONG SWAGE)

TUBE SIZE	TUBE DIA.		DRAWBOLT ASSEMBLY		INCLUDED AS PART OF THE DRAWBOLT ASSEMBLY							
					DRAWBOLT		EXPANDER		SPLIT RING (SEAL RING) (ONLY FOR CRES)	BUSHING	ANTI-EXTRUSION RING	BACK-UP RING (ONLY FOR ALUMINUM)
	mm	in.	SHORT SWAGE	LONG SWAGE	SHORT SWAGE	LONG SWAGE	SHORT SWAGE	LONG SWAGE				
-4	6.35	1/4	6751-04035S	6751-04035L	5642-3035	5642-1035	5944-04035	5945-04035	5937-04035	5264-04035	NA	5835-4-04035
-5	7.94	5/16	6752-05035S	6752-05035L	5643-3035	5643-1035	5944-05035	5945-05035	5937-05035	5264-05035	NA	5835-4-05035
-6	9.52	3/8	6753-06035S	6753-06035L	5902-3035	5902-1035	5944-06035	5945-06035	5937-06035	5264-06035	5942-06	5835-4-06035
-8	12.7	1/2	6754-08035S	6754-08035L	5645-3035	5645-1035	5944-08035	5945-08035	5937-08035	5264-08035	5942-08	5835-4-08035
-10	15.9	5/8	6755-10035S	6755-10035L	5646-3035	5646-1035	5944-10035	5945-10035	5937-10035	5264-10035	5942-10	5835-4-10035
-12	19.1	3/4	6756-12035S	6756-12035L	5647-3035	5647-1035	5944-12035	5945-12035	5937-12035	5264-12035	5942-12	5835-4-12035
-16	25.4	1	6757-16048S	6757-16048L	5986-3048	5986-1048	5944-16048	5945-16048	5937-16048	5264-16048	5942-16	5835-4-16048
-20	31.8	11/4	6758-20035S	6758-20035L	5649-3035	5649-1035	5944-20035	5945-20035	5937-20035	5264-20035	5942-20	5835-4-20035
-24	38.1	11/2	6759-24035S	6759-24035L	5650-3035	5650-1035	5944-24035	5945-24035	5937-24035	5264-24035	5942-24	5835-4-24035

Part Numbers of the Internal Tooling - Unions
Figure 034

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R

INTERNAL TOOLING - SLEEVES
(SHORT AND LONG SWAGE)

TUBE SIZE	TUBE DIA.		DRAWBOLT ASSEMBLY		INCLUDED AS PART OF THE DRAWBOLT ASSEMBLY							
					DRAWBOLT		EXPANDER		SPLIT RING (SEAL RING) (ONLY FOR CRES)	BUSHING	ANTI-EXTRUSION RING	BACK-UP RING (ONLY FOR ALUMINUM)
	mm	in.	SHORT SWAGE	LONG SWAGE	SHORT SWAGE	LONG SWAGE	SHORT SWAGE	LONG SWAGE				
-4	6.35	1/4	6742-04035S	6742-04035L	5642-3035	5642-1035	5944-04035	5945-04035	5937-04035	6150-04035	NA	5835-4-04035
-5	7.94	5/16	6743-05035S	6743-05035L	5643-3035	5643-1035	5944-05035	5945-05035	5937-05035	6150-05035	NA	5835-4-05035
-6	9.52	3/8	6744-06035S	6744-06035L	5902-3035	5902-1035	5944-06035	5945-06035	5937-06035	6150-06035	5942-06	5835-4-06035
-8	12.7	1/2	6745-08035S	6745-08035L	5645-3035	5645-1035	5944-08035	5945-08035	5937-08035	6150-08035	5942-08	5835-4-08035
-10	15.9	5/8	6746-10035S	6746-10035L	5646-3035	5646-1035	5944-10035	5945-10035	5937-10035	6150-10035	5942-10	5835-4-10035
-12	19.1	3/4	6747-12035S	6747-12035L	5647-3035	5647-1035	5944-12035	5945-12035	5937-12035	6150-12035	5942-12	5835-4-12035
-16	25.4	1	6748-16048S	6748-16048L	5986-3048	5986-1048	5944-16048	5945-16048	5937-16048	6150-16048	5942-16	5835-4-16048
-20	31.8	11/4	6749-20035S	6749-20035L	5649-3035	5649-1035	5944-20035	5945-20035	5937-20035	5264-20035	5942-20	5835-4-20035
-24	38.1	11/2	6750-24035S	6750-24035L	5650-3035	5650-1035	5944-24035	5945-24035	5937-24035	6150-24035	5942-24	5835-4-24035

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Part Numbers of the Internal Tooling - Sleeves
Figure 035

R

EXTERNAL TOOLING - UNIONS						
TUBE SIZE	TUBE DIA.		ANVIL	JAW SET		ADAPTER
	mm	in.		SHORT SWAGE	LONG SWAGE	
-04	6.35	1/4	5876-04	5995-1	5995	5329 AND 5930
-05	7.94	5/16	5876-05	5996-1	5996	5329 AND 5930
-06	9.52	3/8	5876-06	5997-1	5997	5930
-08	12.70	1/2	5876-08	5988-1	5988	5930
-10	15.87	5/8	8030-10	8031-10	8031-10-1	5307 AND 5990
-12	19.05	3/4	8030-12	8031-12	8031-12-1	5307 AND 5990
-16	25.4	1	8030-16	8031-16	8031-16-1	5990
-20	31.75	11/4	8030-20	8031-20	8031-20-1	5990
-24	38.1	11/2	8030-24	8031-24	8031-24-1	5990

EXTERNAL TOOLING - SLEEVES						
TUBE SIZE	TUBE DIA.		ANVIL	JAW SET		ADAPTER
	mm	in.		SHORT SWAGE	LONG SWAGE	
-04	6.35	1/4	5284-04	5772	5598	5329 AND 5930
-05	7.94	5/16	5284-05	5773	5599	5329 AND 5930
-06	9.52	3/8	5286-06	5774	5600	5930
-08	12.70	1/2	5288-08	5775	5601	5930
-10	15.87	5/8	5310-2	5776	5602	5307 AND 5990
-12	19.05	3/4	5311-2	5777	5603	5307 AND 5990
-16	25.4	1	5312-2	5778	5604	5990
-20	31.75	11/4	5313-2	5779	5605	5990
-24	38.1	11/2	5314-2	5606	5606	5990

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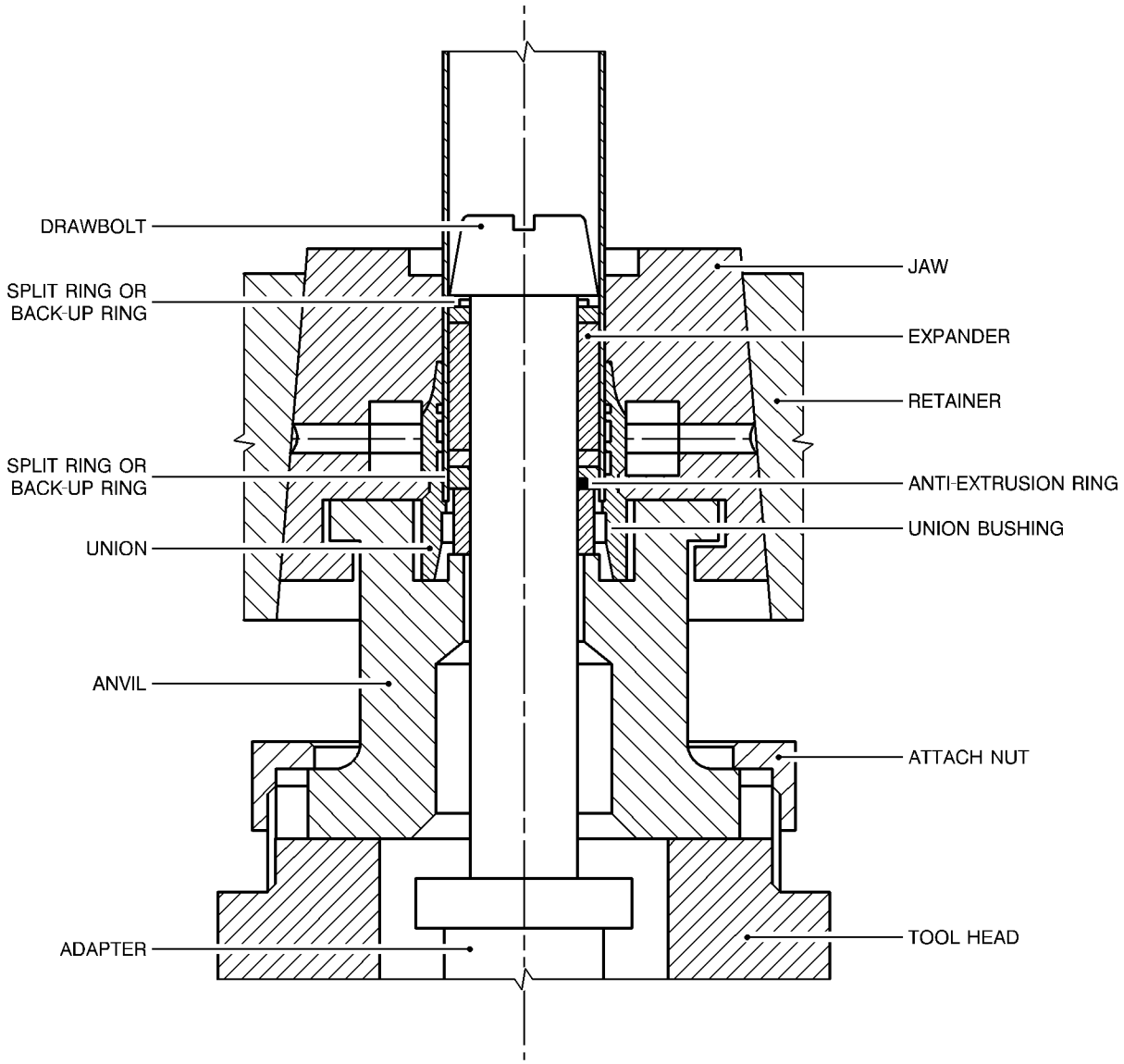
Part Numbers of the External Swaging Tools
Figure 036

R



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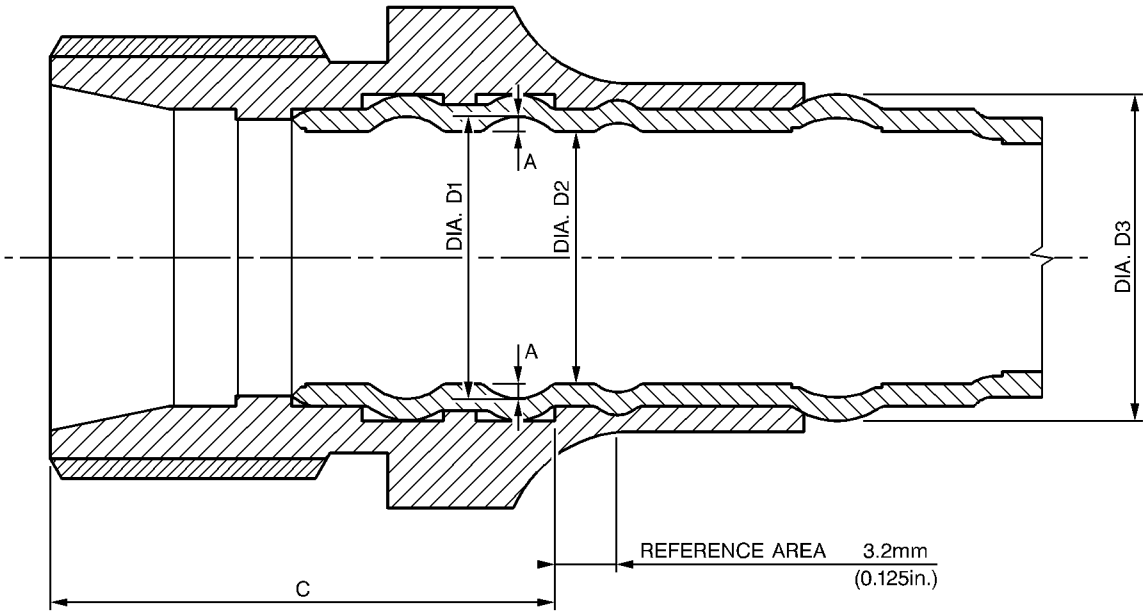
Tool Assembly for Union
Figure 037

R

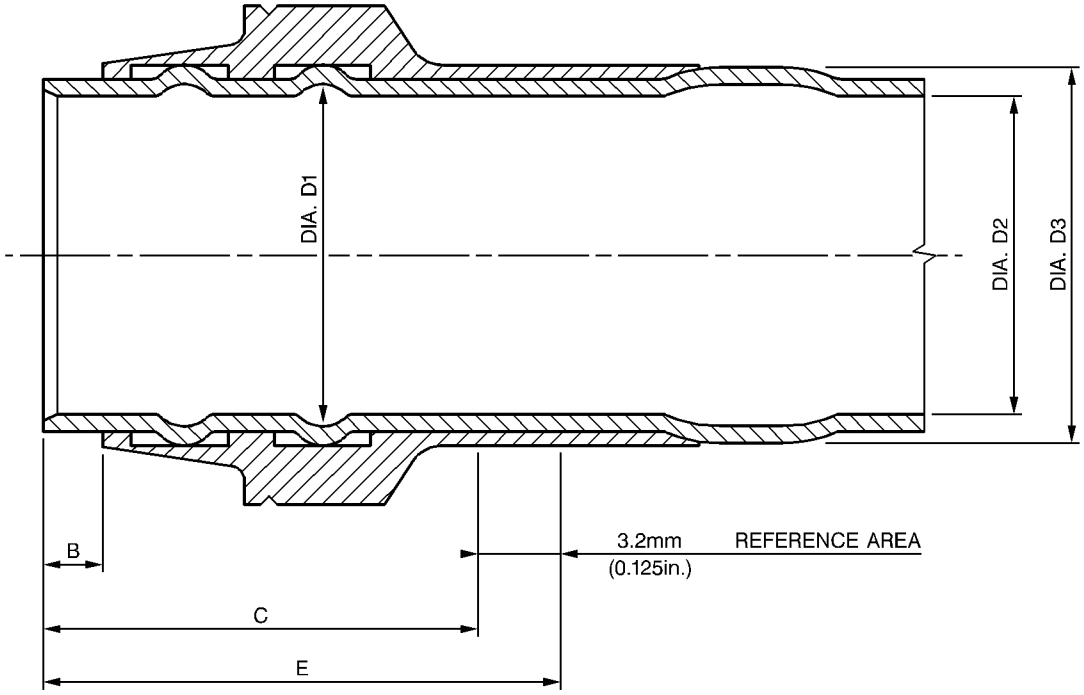


TUBE SIZE	TUBE DIA.		C		WAVE DEFORMATION 2A				DIA. D3 MAX.	
					MIN.		MAX.			
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
-04	6.35	1/4	18.87	0.743	0.43	0.017	0.61	0.024	6.8	0.267
-05	7.94	5/16	19.22	0.756	0.43	0.017	0.61	0.024	8.38	0.330
-06	9.52	3/8	19.25	0.757	0.43	0.017	0.61	0.024	9.98	0.392
-08	12.70	1/2	21.10	0.830	0.58	0.023	0.79	0.031	13.18	0.518
-10	15.87	5/8	23.62	0.930	0.53	0.021	0.71	0.028	16.35	0.643
-12	19.05	3/4	23.72	0.934	0.58	0.023	0.79	0.031	19.53	0.769
-16	25.40	1	26.23	1.032	0.74	0.029	0.94	0.037	25.88	1.019
-20	21.75	11/4	26.23	1.032	0.76	0.030	0.97	0.038	32.25	1.270
-24	38.10	11/2	26.62	1.048	0.74	0.029	0.94	0.037	38.73	1.524

BM5 20 23 11 0 AQM0 24

Inspection of the Swaged Union for NSA 855010
Figure 038

R



TUBE SIZE	TUBE DIA.		B		C		WAVE DEFORMATION 2A				DIA. D3 MAX.	
			±0.25	±0.1			MIN.		MAX.			
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
-04	6.35	1/4	2	0.079	13.31	0.524	0.51	0.020	0.81	0.032	6.60	0.260
-05	7.94	5/16	2.4	0.095	14.22	0.560	0.51	0.020	0.81	0.032	8.18	0.322
-06	9.52	3/8	2.5	0.098	14.30	0.563	0.51	0.020	0.81	0.032	9.78	0.385
-08	12.70	1/2	2.5	0.098	14.35	0.565	0.51	0.020	0.81	0.032	12.98	0.511
-10	15.87	5/8	3.6	0.142	15.37	0.605	0.56	0.022	0.86	0.034	16.15	0.635
-12	19.05	3/4	3.6	0.142	15.37	0.605	0.66	0.026	0.96	0.037	19.33	0.761
-16	25.40	1	5.2	0.205	17.02	0.670	0.71	0.028	1.02	0.040	25.68	1.011
-20	21.75	11/4	5.1	0.200	16.92	0.666	0.66	0.026	1.07	0.042	32.05	1.261
-24	38.10	11/2	7	0.275	18.82	0.741	0.66	0.026	1.07	0.042	38.53	1.517

BM5 20 23 11 0 ASMA 01

R Inspection of the Swaged Sleeve for NSA 855034
Figure 039

R NOTE : Each fitting is supplied in a plastic bag which also contains a
R positioning template and tape.
R (3)Cut the tube (Ref. Fig. 013).
R (a)Remove the damaged parts of the tube and the defective ends with the
R applicable chipless cutting-tool:
R - D12530-001, tubes from 1/4" to 3/8",
R - D12531-001, tubes from 1/2" to 3/4",
R - D12532-001, tubes from 1" to 1-1/2".
R NOTE : The maximum distance between the ends of the tubes is 5.84 mm
R (0.2299 in.).
R 1 Put the tubing cutter in the correct position on the tube.
R 2 Tighten the drive screw until the cutter wheel lightly touches the
R tube. Then give the drive screw a 1/8 to 1/4 turn.
R 3 Turn the ratchet handle through the arc of clearance until it turns
R loosely.
R 4 Do the steps again to cut through the tube.
R 5 Cut the tube slowly and smoothly to make sure that the end of the
R tube does not change its shape.
R 6 Regularly lubricate the ratchet, the rollers and the cutter wheel
R with OILS (Material No. 03-001) for easy operation.
R (4)Deburr the tube.
R (a)Deburr the internal diameter.
R 1 Use the deburring tool and the stem subassembly that are correct for:
R - the diameter of the tube,
R - the thickness of the wall (Ref. Fig. 013).
R 2 Make sure that the deburring tool is clean. Lubricate it with
R HYDRAULIC FLUIDS (Material No. 02-003).
R 3 Prepare to deburr the tube:
R - hold the tube,
R - push in the plunger of the tool,
R - put the stem into the end of the tube,
R - release the plunger to let the stem become expanded and seal the
R tube (Ref. Fig. 015).
R 4 Deburr the tube:
R - continue to hold the tube,
R - apply light pressure on the cutter and at the same time turn the
R knurled body clockwise,
R - continue to turn until the tube is deburred.
R 5 Do not push the plunger in, but:
R - carefully and slowly pull the deburring tool from the tube, until
R you can see the first ridge of the stem,
R - clean the end of the tube and the stem.
R 6 If the end of the tube is not correctly deburred:
R - push the tool into the tube,
R - do the step 4 again,
R - pull the tool out of the tube.
R 7 Fully clean the stem with CLEANING AGENTS (Material No. 11-003) if it
R touched the fluid and dry it immediately.
R (b)Deburr the external diameter.
R NOTE : Do not cause damage to the seals of the fittings:
R - the tubes must not have external burrs,

R - the tubes must go freely into the fittings.
R If a tube does not go freely into a fitting (not circular, out
R of tolerance), do not install the fitting.
R 1 Remove the burrs on the external diameter of the tube with Grade 240
R emery cloth.
R Burrs on the external diameter of the tube can cause damage to the
R seals in the fittings. This damage can cause external leakage.
R The surfaces must be clean and without dmage:
R - the swaging area must have no deep scratches and must be clean
R (no dust, particles of metal, etc.).
R Before you swage, clean the end of the tube with a clean cloth.
R (c)Remove the paint (if applicable).
R NOTE : You can do the installation on parts that have alodine
R treatment. You must not do the installation on parts that
R are painted.
R 1 Remove the paint, with grade 400 emery cloth, on a sufficient length
R so that you swage the union on a bare area. Make sure that you do not
R make scratches on the tubes when you remove the paint.
R 2 Make sure that all the tube ends are in the correct condition and
R agree with the tube dimension specifications.
R 3 Clean all the tube ends with **CLEANING AGENTS** (Material No. 11-003).
R (5)Installation of the H-fittings.
R (a)Installation procedure for **SIERRACIN/HARRISON** H-fittings.
R (Ref. Fig. 042)
R (Ref. Fig. 043)
R NOTE : You can repair damaged areas that are less than or equal to
R 9.52 mm (0.3748 in.) across. You must splice damaged areas that
R are larger. The minimum dimension that you can splice is
R 114.3 mm (4.5000 in.).
R 1 Cut and deburr the tube in the damaged area (A).
R Refer to Cut and Deburr the tube paragraph B. and C.
R Make sure that the maximum gap between the two ends of the tube is
R not more than 5.84 mm (0.2299 in.).
R 2 Use the template to find the position of the tape (5) at index (7) on
R the tube at 14.22 mm (0.5598 in.) from the end of the tube.
R 3 Locate and mark the tube insertion mark (6).
R 4 Wind on only one layer of tape (5). Cut off the unwanted tape.
R 5 Put the union (2) in position against the tape (5).
R 6 Engage the slide (4) on the tube. The rounded end of the slide must
R be against the union (2).
R 7 Engage the nut (1) on the slide (4) side.
R 8 Engage the coupling (3) on the union (2) side.
R 9 Engage the nut (1) in the coupling (3) and tighten it with the
R union (2) against the tape (5).
R 10 Hold the coupling end. Do not turn the coupling (3).
R 11 Tighten the nut (1) until you feel a high torque. This occurs
R when the slide (4) and the coupling (3) close tightly against the
R union (2).
R 12 Make sure that you can see the insertion mark on the tube.
R 13 Remove the nut (1). Make sure that the slide (4) and the coupling (3)
R are between 3.8 mm (0.1496 in.) and 0 mm (0.0000 in.) from the

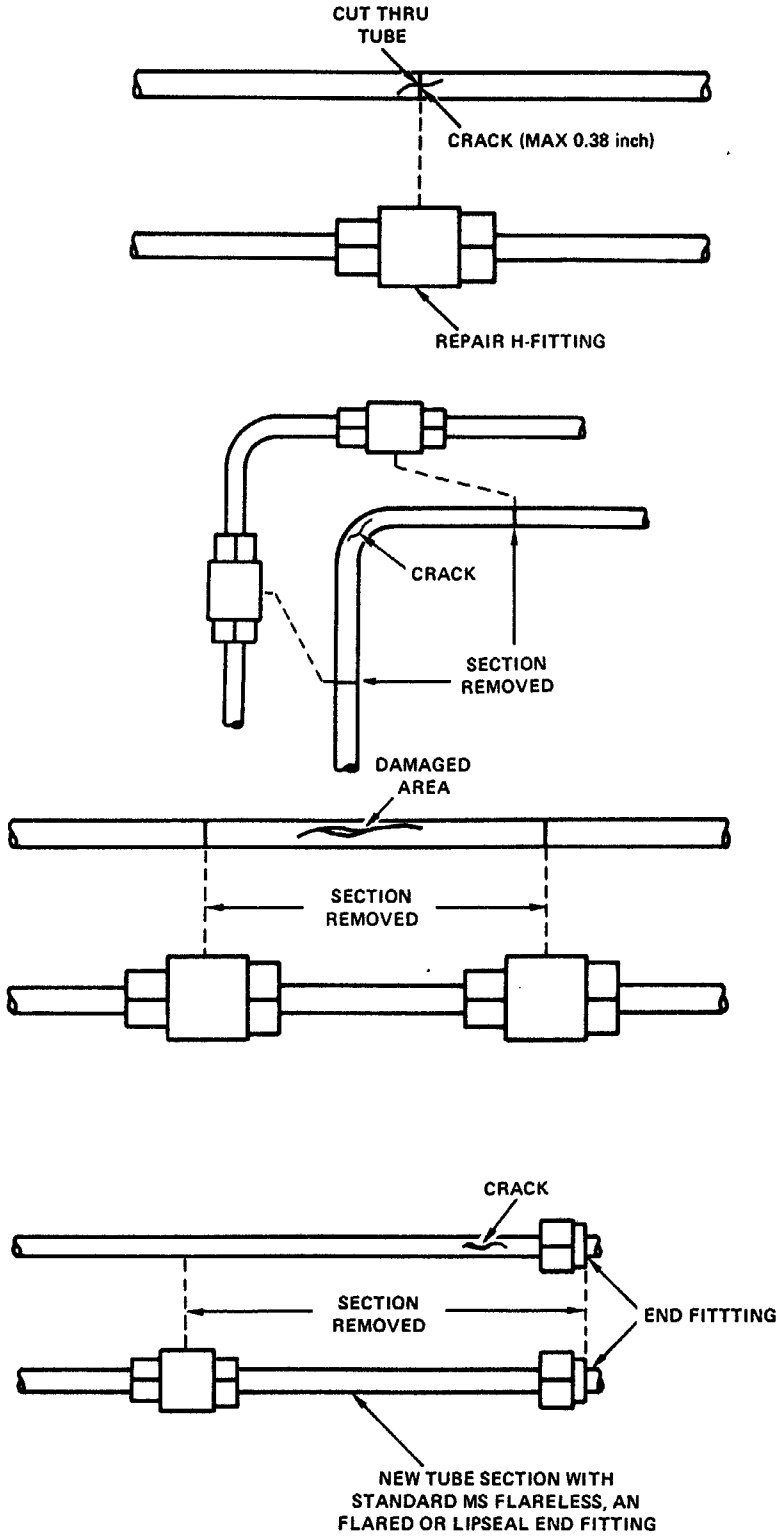
R shoulder of the union. If not, tighten the nut (1) until the slide
R (4) and the coupling (3) are in the correct position.
R 14 The union (2) must touch the tape (5).
R 15 The edge of the coupling (3) must be across the mark on the tube.
R 16 Tighten the assembly to complete the swaging procedure.
R 17 Do the applicable bleeding procedure (Ref. 29-00-00, P. Block 401).
R 18 Pressurize the aircraft hydraulic system to the design operating
R pressure and do a check for leaks.
R (6)Make sure that the work area is clean and clear of tools and other items.
R (a)If there are fluid leaks, cut the H-fitting and install a new short
R tube with two H-fittings at the two ends of the tube (Ref. sheet
R 250.1/1 section removed).

F. Temporary Repair Scheme

R This task gives the permitted temporary repairs on hydraulic tubes.
R This procedure is applicable to:
R - Corrosion-resistant steel (21-6-9) tubes Ref. ASNA3288,
R sizes -04 to -24.
R - Aluminum alloy (6061-T6) tubes Ref. ASNA3410, DAN40,
R sizes -04 to -16 and -24.
R NOTE : You must not do a temporary repair on:
R - hydraulic tubes in engine area,
R - hydraulic tubes in the pylon box structure and
R pylon forward secondary structure,
R - coiled flexible tubes,
R - hydraulic tubes installed on the landing gear legs.

R | ITEM | DESIGNATION |
|---|---|
R | (1)Material No. 02-003 | Hydraulic Fluids (Ref. 20-31-00) |
R | (2)Material No. 11-003 | Cleaning Agents (Ref. 20-31-00) |
R | Referenced Procedure | |
R | - 20-23-14, P. Block 1 | Protection from Vibration and Chafing of Hydraulic Pipes |
R | - 29-00-00, P. Block 401 | General - Removal/Installation |

R (1)General
R (a)Temporary repair with MS21922 sleeve (Ref. Fig. 044).
R 1 This temporary repair is applicable only for hydraulic tubes in
R 21-6-9 corrosion-resistant steel or 6061-T6 aluminum alloy.
R 2 Do not use MS21922 sleeves for permanent repairs. These sleeves are
R for temporary repairs (no more than 2500 flight hours).
R Complete this procedure with the applicable permanent repair
R procedure.
R - repair of the hydraulic tubes with PERMASWAGE fittings,
R - repair of the hydraulic tubes with HARRISON sleeves and unions,
R - repair of the hydraulic tubes with SIERRACIN/HARRISON H-fittings.
R - repair of the hydraulic tubes with CRYOFIT Couplings 3PHS111-XX
R - repair of the hydraulic tubes with RYNGLOK R8 fittings.
R 3 You can use MS sleeves to do repairs on tubes that have MS 33514 or
R MS 33515 fittings. No special tools are necessary. The subsequent



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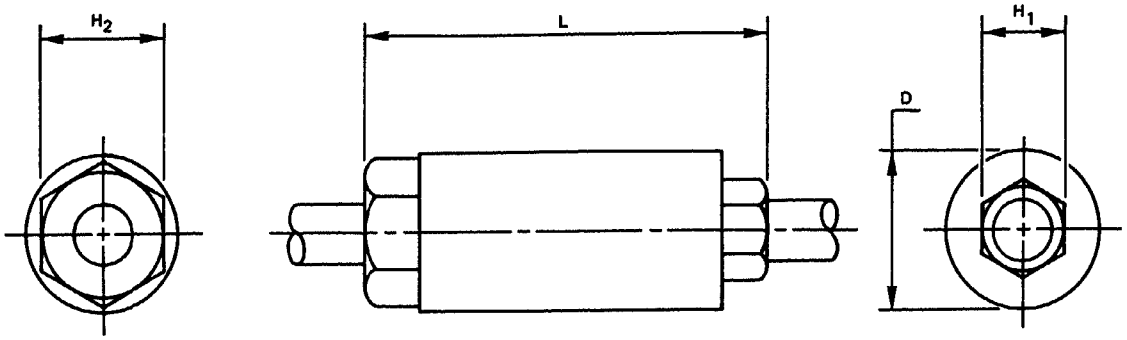
Repair Type
Figure 040



Sierracin/Harrison Part Number	Tube O.D.		"D" Dia.		"H_1"		"H_2"		"L" Before Swage		"L" After Swage	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
36011V04	1/4	6.35	.780	19.81	.438	11.13	.688	17.48	3.03	76.96	2.35	59.69
36011V05	5/16	7.94	.900	22.86	.500	12.70	.750	19.05	3.21	81.53	2.35	59.69
36011V06	3/8	9.52	.950	24.13	.625	15.87	.750	19.05	3.14	79.76	2.35	59.69
36011V08	1/2	12.70	1.125	28.56	.750	19.05	.875	22.22	3.25	82.55	2.35	59.69
36011V10	5/8	15.87	1.300	33.02	.875	22.22	1.063	27.00	3.26	82.80	2.35	59.69
36011V12	3/4	19.05	1.420	36.07	.938	23.83	1.250	31.75	3.43	87.12	2.95	74.93
36011V16	1"	25.40	1.700	43.18	1.187	30.15	1.500	38.10	3.46	87.88	2.95	74.93

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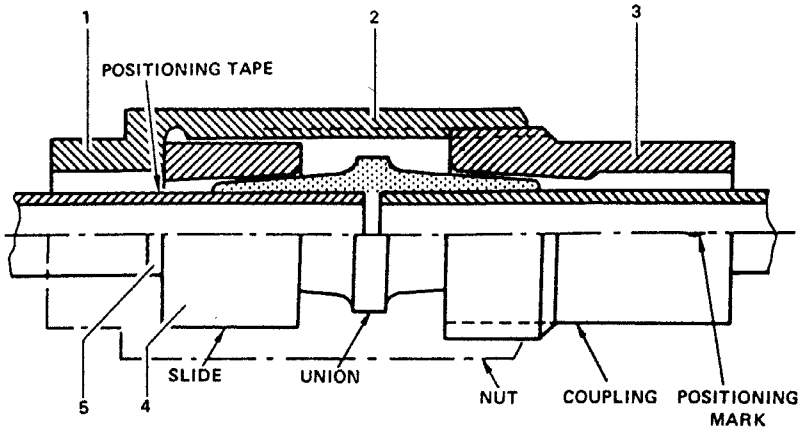
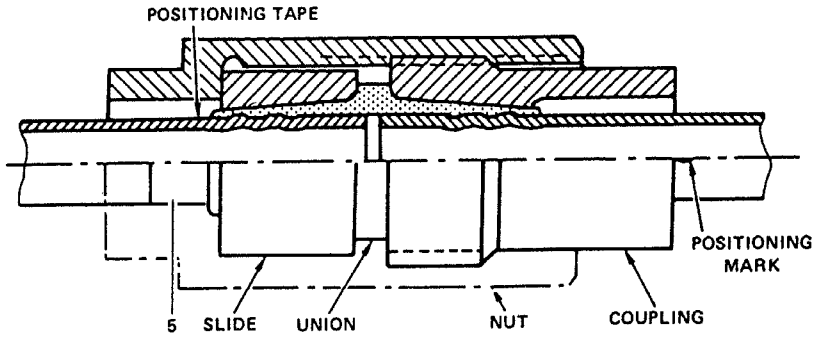
Dimensions and Part Numbers
Figure 041



WHEN THE NUT, SLIDE, UNION, AND COUPLING ARE IN POSITION ON THE TUBE, THE GAP BETWEEN THE CUT TUBE ENDS IS IN THE CENTER OF THE UNION. ONE END OF THE UNION RESTS AGAINST THE TAPE.



ONCE THE "H" FITTING HAS BEEN SWAGED (TORQUED), THE SIDE AND THE COUPLING HAVE "BOTTOMED" ONTO THE UNION, MAKING A PERMANENT SEAL. THE UNION STILL RESTS AGAINST THE TAPE, AND THE DOT IS NOW INTERSECTED BY THE HEX-END OF THE COUPLING.

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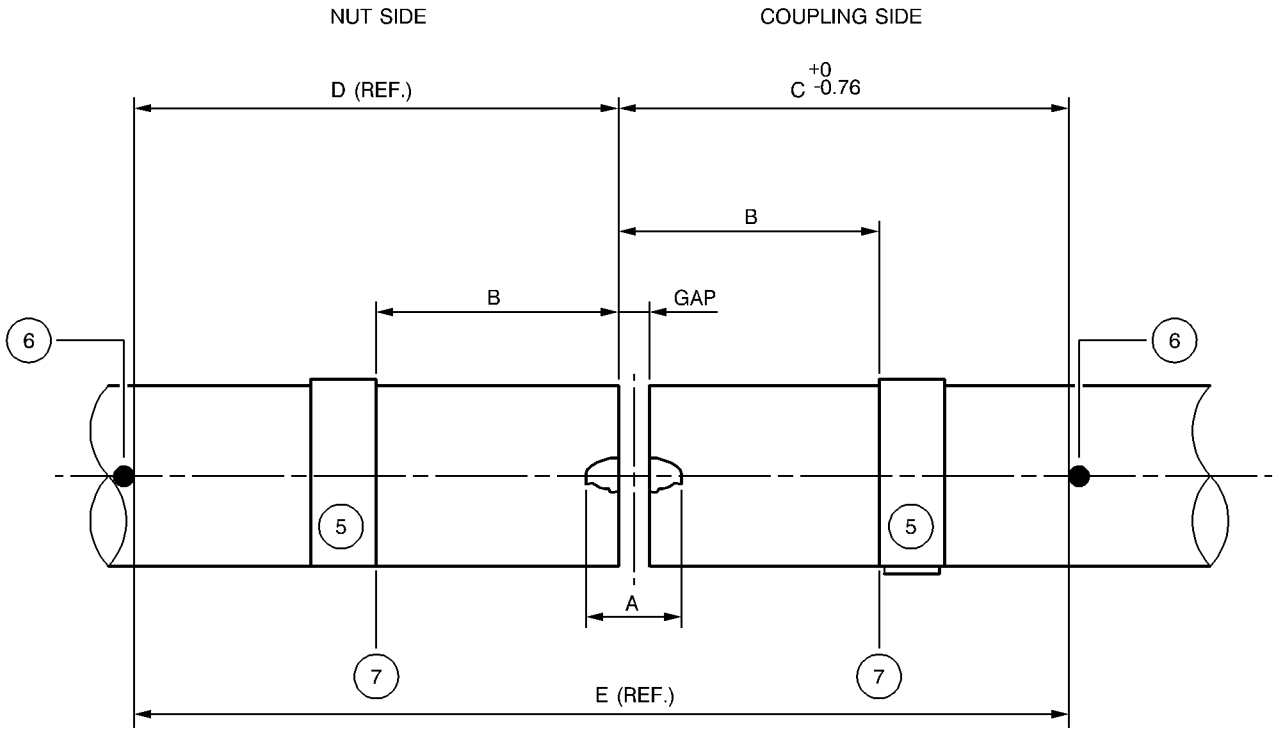
H-Fitting Installation
Figure 042



5 POSITIONING TAPE

6 INSERTION MARK

7 INDEX LINE

MARK	DESIGNATION	DIMENTION IN mm (in.)	TUBE SIZE
A	DAMAGED AREA	9.52 (0.38)	-04 to -16
B	POSITIONING TAPE	min 14.22 (0.5598)	-04 to -16
C	INSERTION MARK	36.6 (1.4409)	-04 to -10
		44.2 (1.740)	-12 and -16
D	INSERTION MARK	22.9 (0.90)	-04 to -16

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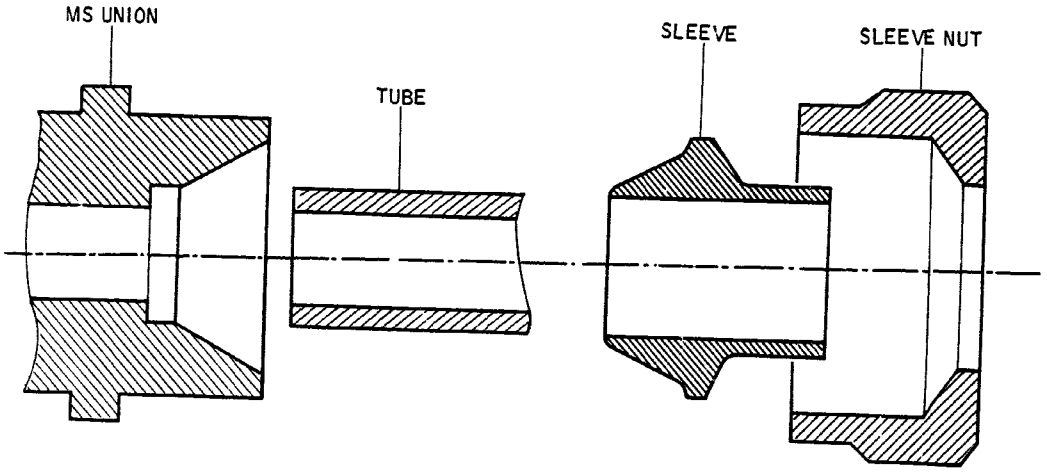
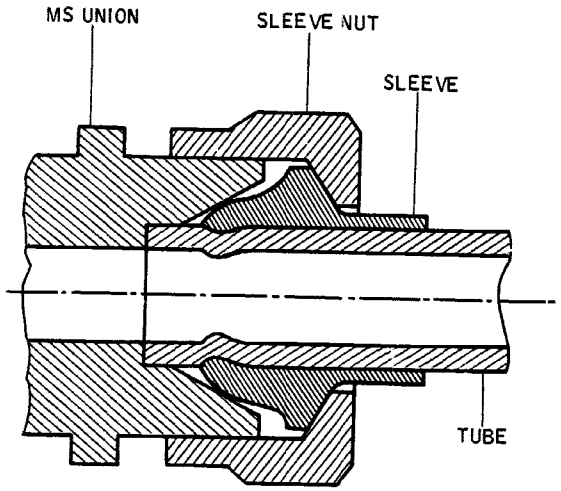
Tube Preparation
Figure 043

R separation of joints with MS sleeves is possible. You must remove the
R tubes when you swage with MS sleeves.
R (b)Temporary repair of a tube with a flexible hose.
R 1 A temporary repair of pipe with a flexible hose has a life limited to
R 20 takeoffs.
R Do a daily inspection of the repair to make sure that it is in the
R correct condition.
R 2 A temporary repair of a flexible hose with a flexible spare hose
R connected to a part or equipment, which can have different positions,
R is limited to 20 takeoffs.
R Do an inspection of the repair after first flight to make sure that
R it is in the correct condition. If there are no findings after first
R flight, do a daily inspection afterwards.
R 3 A temporary repair of a flexible hose with a flexible spare hose
R connected to a part or equipment with a fixed position is limited to
R 20 takeoffs.
R Do a daily inspection of the repair to make sure that it is in the
R correct condition.
R (2)Repair with a MS 21922 sleeve.
R (a)Determine the length of tube to be cut as a function of the location
R of the damage area. (Ref. Fig. 050, 051, 052)
R (Ref. Fig. 053)
R NOTE : If you must use another tube to repair the damaged area, use a
R rigid tube of the same type as the tube to be repaired, if
R possible. If you use a flexible hose for the repair, refer to
R the temporary repair procedure of tubes with flexible hoses
R (this procedure is in this task).
R (b)Cut the tube.
R Cut and deburr the inner and outer diameters of the ends of the tubes.
R (c)Clean the end of the tube with CLEANING AGENTS (Material No. 11-003).
R (d)Install the fitting.
R 1 Put the nut and the sleeve on the tube.
R NOTE : Make sure that the cutting edge of the sleeve points to the
R end of the tube.
R 2 Lubricate with HYDRAULIC FLUIDS (Material No. 02-003):
R - the threads and the contact face of the nut,
R - the threads of the union.
R 3 Put the end of the tube into the fitting.
R (e)Do the swaging (Ref. Fig. 045).
R 1 Hold the tube against the shoulder of the union and tighten the nut
R fully with your hand.
R 2 From this position, tighten the nut to swage the sleeve (obey the
R number of turns for the nut).
R (f)Do a check of the tube joint.
R 1 Loosen the nut and examine the swaging of the sleeve:
R - there must be a small bulge between the cutting edge and the
R contact shoulder of the nut,
R - the surface of the sleeve must be smooth (there must be no cracks
R or surface defects),
R - the end of the sleeve must not be flat (the nut must move freely
R along the sleeve).

BEFORE SWAGING



AFTER SWAGING



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Repair Principle Using MS Sleeve
Figure 044

TUBE DIA		NUMBER OF TURNS FOR NUT MS21921	
in	mm	TUBE IN 21.6.9	TUBE IN 6061.T6
1/4	6.35	1 1/4	1 1/4
5/16	7.94	1 1/4	1 1/4
3/8	9.52	1 1/4	1 1/6
1/2	12.70	1 1/4	1 1/6
5/8	15.87	1 1/3	1 1/12
3/4	19.05	1 5/12	1 1/12
1	25.40	1 5/12	1
1 1/2	38.10	1 1/3	1

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Initial Torque for Nuts
Figure 045

R 2 Install the lines. Use the specified torque values (refer to the
R table) (Ref. Fig. 046).
R NOTE : You must use these torque values each time that you assemble
R the tubes.

TUBE DIA		TORQUE VALUES							
		TUBES IN 21.6.9				TUBES IN 6061-T6			
		MIN.		MAX.		MIN.		MAX.	
in	mm	mdaN	lbf.in	mdaN	lbf.in	mdaN	lbf.in	mdaN	lbf.in
1/4	6.35	1.5	133	1.7	150	1.2	106	1.3	115
5/16	7.94	2.0	177	2.3	204	1.5	133	1.7	150
3/8	9.52	2.9	257	3.2	283	1.8	159	2.0	177
1/2	12.70	5.4	477.5	5.9	522.5	3.0	265	3.3	292
5/8	15.87	7.5	664	8.3	734.5	3.9	345	4.3	381
3/4	19.05	9.7	859	10.7	947	4.8	425	5.3	468.5
1	25.40	12.9	1141.5	14.2	1257	8.1	717	8.9	787.5
1 1/2	38.10	21.5	1903	23.7	2098	9.7	859	10.7	947

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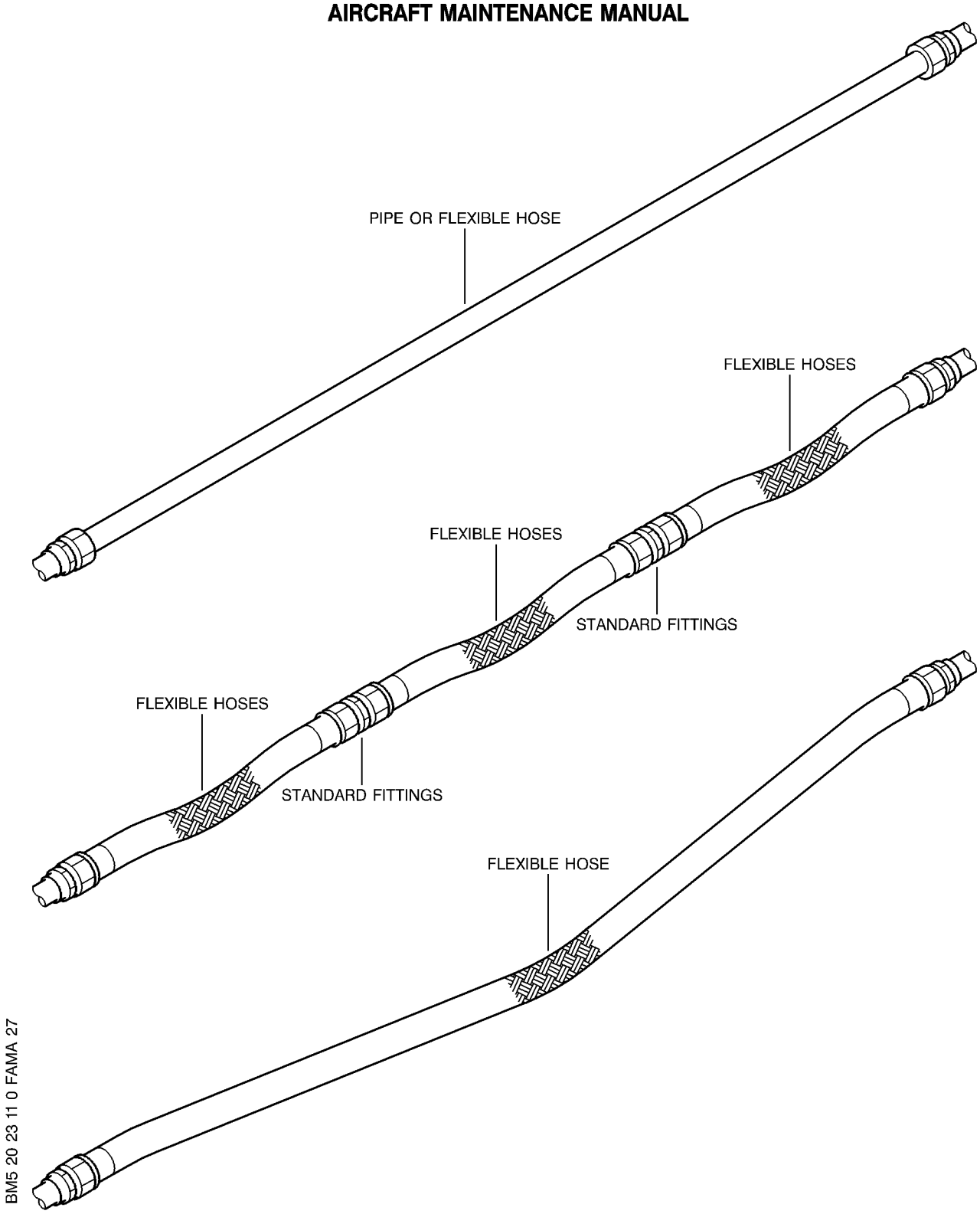
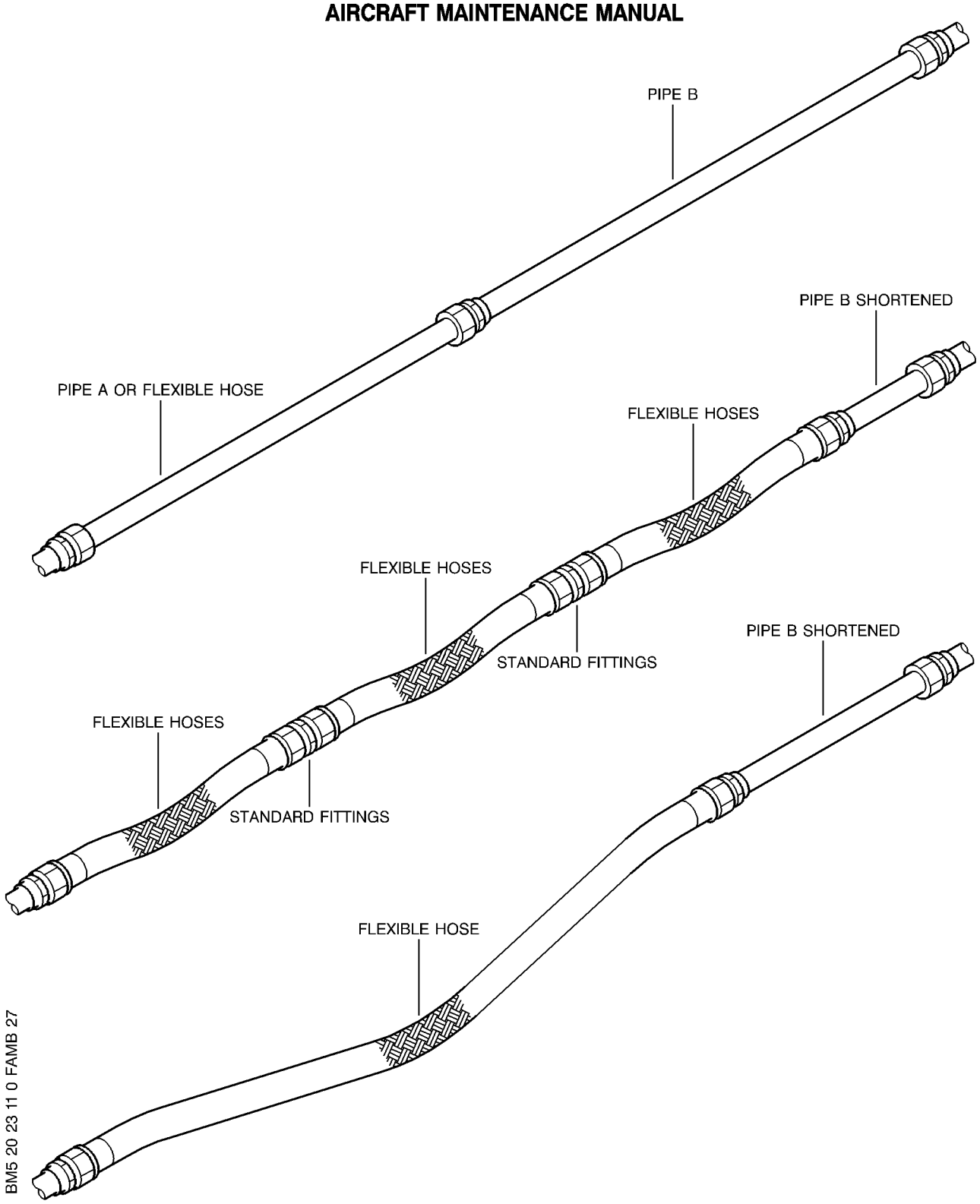
Torque Values
Figure 046

R (3)Temporary repair procedure of pipes with flexible hose
R A temporary repair of pipes with a flexible hose is limited to
R 20 takeoffs. This life limit can be extended to 1000 flight hours or
R 750 flight cycle, whichever comes first, (if there is no other hydraulic
R line temporary-repair on the three hydraulic systems), with an inspection
R as follows:
R - first inspection after first flight,
R - further inspections at weekly intervals.
R (a)Installation conditions.
R 1 A temporary repair with a flexible hose is permitted on two hydraulic
R systems if there is no hydraulic line temporary-repair on the third
R hydraulic system.
R 2 A temporary repair with two or more flexible hoses end-to-end is
R permitted if:
R - the repair is on one pipe only (between two pipe connections),
R - only standard fittings are installed between the flexible hoses
R (if needed) (Ref. Fig. 047).
R (b)Operational conditions:
R 1 If there is additional hydraulic line temporary-repair on one of the
R three hydraulic systems it is mandatory to:
R - replace the temporary repair (flexible hose) by a permanent repair
R after 20 takeoffs,
R - do a daily inspection of the repair to make sure that it is in the
R correct condition.
R 2 If there is no additional hydraulic line temporary-repair on the
R three hydraulic systems it is mandatory to:
R - replace the temporary repair (flexible hose) by a permanent repair
R at 1000 flight hours or 750 flight cylce, whichever comes first,
R - do the first inspection of the repair after the first flight to
R make sure that it is in the correct condition, and do further
R inspections at weekly intervals.
R 3 If possible, attach the flexible hose to an adjacent pipe or other
R hose with ty-wraps and spacers (Ref. 20-23-14, P. Block 001) to
R prevent chafing with the adjacent structure. If there a risk of
R chafing between the hose and the structure/component, install a
R chafe guard on the related section of the hose.
R (c)The flexible hose that you use must:
R - at minimum, be specified for use with the operation pressure in the
R system,
R - be specified for use with the type of fluid used in the system,
R - have, at least, the same inside diameter as the damaged tube,
R - have sufficient length to replace the damaged tube or the damaged
R part of the tube.
R (d)Obey these installation rules:
R 1 The flexible hose must have an over length or curve to make an
R allowance for length variations due to pressure.
R The hose length changes:
R - from +2 to -2.9% for a moderate pressure,
R - from +2 to -2% for a high pressure.
R 2 There must be no flexure at the fittings. The hose must be straight
R for at least two hose diameters from the fitting.



Temporary Hydraulic Tubing Repair - Sheet 1/2
Figure 047



Temporary Hydraulic Tubing Repair - Sheet 2/2
Figure 047

R 3 Obey the minimum bend radius of the hose (Ref. Fig. 048, 049) to
R prevent sharp bends in the hose assembly, use:
R - elbow fittings,
R - hose with elbow-type end fittings.
R 4 When you install the hoses, you must not twist them. This can cause
R the hose to break or the attachment nuts to become loose. The use of
R swivel connections at one end or at the two ends will prevent twist
R stresses.
R 5 In all operation conditions, there must be clearance between the hose
R assemblies and:
R - the other lines,
R - the adjacent structure,
R - the equipment.
R Hose minimum clearances must be as follows:

HOSE CLEARANCE TO	MINIMUM CLEARANCE INCH (mm)
CONTROL CABLES AND LINKAGES	1.0 (25.4 mm)
CABLE AT PULLEYS	0.5 (12.7 mm)
CABLE AT MIDDLE OF SPAN	2.0 (50.8 mm)
ELECTRICAL WIRING	0.5 (12.7 mm)
HYDRAULIC TUBES	0.2 (5 mm)
HOSES (2 SYSTEMS)	0.4 (10 mm)
HOSES (1 SYSTEM)	0.2 (5 mm)

R 6 When you install the hose assembly supports, make sure that they do
R not cause distortion of the rigid lines (this can occur when the
R lines and hoses move in relation to each (other). Use a correct
R number of clamps so that the lines are correctly routed along the
R contour of the structure. This prevents abrasive wear, kinks and
R entanglement during flexure. You must install clamps, at a minimum,
R at locations where the tube clamps were. You must not attach hoses
R around their outside diameters with tight, rigid clamps which prevent
R all movement. Some hoses between rigid connections must move
R longitudinally. In this case, use clamps of a type which will not
R cause wear on the hose casing. You must attach the connections at the
R tube, not at the hose.
R NOTE : When the lines have rigid tubes, wind Teflon tape around the
R hose after protection.
R (e)If necessary for repair, install the applicable fittings on the ends
R of the tubes to connect the flexible hose assembly. Obey the
R installation rules related to the flexible hoses. Make sure that the
R fittings to be installed on the tubes are compatible with the fittings

LOW PRESSURE HOSE ASSIES
AEROQUIP SERIES 666/667

DIA	1/4	5/16	3/8	1/2	5/8	3/4	1	1-1/2
MIN. BEND RADIUS in.	2	2	4	4.62	5.5	6.5	7.38	14
MIN. BEND RADIUS mm	50.8	50.8	101.6	117.4	139.7	165.1	187.5	355.6

HIGH PRESSURE HOSES ASSIES
AEROQUIP SERIES

DIA	MINIMUM BEND RADIUS					
	SERIES AE313/513		SERIES AE246/546		SERIES AE345/545	
	in.	mm	in.	mm	in.	mm
1/4	-	-	1.5	38.1	-	-
3/8	-	-	2.5	63.5	-	-
1/2	-	-	2.88	73.2	-	-
5/8	-	-	3.25	82.6	-	-
3/4	-	-	3.88	98.6	4.0	101.6
1	5.0	127.0	-	-	-	-

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Minimum Bend Radius for Hydraulic Line - AEROQUIP SERIES
Figure 048

LOW PRESSURE HOSE ASSIES
TITEFLEX SERIES 130

DIA.	1/4	5/16	3/8	1/2	5/8	3/4	1	1/1/2
MIN. BEND RADIUS in.	2	2	4	4.6	5.6	6.5	7.3	14
mm	50.8	50.8	101.6	116.8	139.7	165.1	185.4	355.6

HIGH PRESSURE HOSE ASSIES
TITEFLEX SERIES

DIA.	MINIMUM BEND RADIUS			
	TITEFLEX SERIES 660		TITEFLEX SERIES 230 OR 240	
	in.	mm	in.	mm
1/4	3	76.2	1.5	38.1
3/8	5	127.0	2.5	63.5
1/2	5.75	146.1	2.88	73.2
5/8	6.5	165.1	3.22	81.8
3/4	7.75	196.85	3.88	98.6
1	9.63(1)	244.60(1)	5(2)	127(2)

(1) DIA 1": NOT APPLICABLE FOR HOSE WITH ANTI-ABRASION SLEEVE

(2) DIA 1": APPLICABLE ONLY FOR SERIES 240

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Minimum Bend Radius for Hydraulic Line - TITEFLEX SERIES
Figure 049

R on the flexible hose assembly. For MS 21922 sleeve installation, refer
R to the repair procedure with a MS 21922 sleeve in this task.
R (4)Temporary Repair Procedure of a Flexible Hose with Flexible Spare Hose
R (connected to a part or equipment, which can have different positions).
R NOTE : A temporary repair of a flexible hose with a flexible spare hose
R connected to a part or equipment, which can have different
R positions, is limited to 20 takeoffs.
R Do an inspection of the repair after first flight to make sure
R that it is in the correct condition. If there are no findings
R after first flight, do a daily inspection afterwards.
R (a)Installation conditions.
R 1 A temporary repair with a flexible spare hose is permitted on two
R hydraulic systems if there is no hydraulic line temporary repair on
R the third hydraulic system.
R 2 A temporary repair with two or more flexible hoses end-to-end is
R permitted if:
R - the repair is on one flexible hose only,
R - only standard fittings are installed between the flexible spare
R hoses (if needed) (Ref. Fig. 047).
R (b)Operational conditions:
R 1 It is mandatory is:
R - replace the temporary repair by a permanent repair after
R 20 takeoffs,
R - do an inspection of the repair after first flight to make sure that
R it is in the correct condition. If there are no findings after
R first flight, do a daily inspection afterwards.
R 2 If possible, attach the flexible spare hose to an adjacent pipe or
R other hose with ty-wraps and spacers (Ref. 20-23-14, P. Block 001)
R to prevent chafing with the adjacent structure. Make sure that there
R is enough space for movement of the flexible spare hose. If there is
R a risk of chafing between the hose and the structure/component,
R install a chafe guard on the related section of the hose.
R (c)The flexible hose that you use must:
R - at minimum, be specified for use with the operation pressure in the
R system,
R - be specified for use with the type of fluid used in the system,
R - have, at least, the same inside diameter as the damaged flexible
R hose,
R - have sufficient length to replace the damaged flexible hose.
R (d)Obey these installation rules:
R 1 The flexible spare hose must have an overlength or a curve to make an
R allowance for length variations due to pressure.
R The hose length changes:
R - from +2 to -2.9% for a moderate pressure,
R - from +2 to -2% for a high pressure.
R 2 There must be no flexure at the fittings. The hose must be straight
R for at least two hose diameters from the fittings.
R 3 Obey the minimum bend radius of the hose (Ref. Fig. 048, 049).
R To prevent sharp bends in the hose assembly, use:
R - elbow fittings,
R - hose with elbow-type end fittings.

R 4 When you install the hoses, you must not twist them. This can cause
R the hose to break or the attachment nuts to become loose. The use of
R swivel connections at one end or at the two ends will prevent twist
R stresses.
R 5 In all operation conditions, during the complete movement, there must
R be clearance between the hose assemblies and:
R - the other lines,
R - the adjacent structure,
R - the equipment.
R Hose minimum clearances must be as follows:

HOSE CLEARANCE TO	MINIMUM CLEARANCE INCH (mm)
CONTROL CABLES AND LINKAGES	1.0 (25.4 mm)
CABLE AT PULLEYS	0.5 (12.7 mm)
CABLE AT MIDDLE OF SPAN	2.0 (50.8 mm)
ELECTRICAL WIRING	0.5 (12.7 mm)
HYDRAULIC TUBES	0.2 (5 mm)
HOSES (2 SYSTEMS)	0.4 (10 mm)
HOSES (1 SYSTEM)	0.2 (5 mm)

R 6 When you install the hose assembly supports, make sure that they do
R not cause distortion of the rigid lines (this can occur when the
R lines and hoses move in relation to each other). Use a correct number
R of clamps so that the lines are correctly routed along the contour of
R the structure. This prevents abrasive wear, kinks and entanglement
R during flexure. You must install clamps, at a minimum, at locations
R where the flexible hose clamps were. You must not attach hoses around
R their outside diameters with tight, rigid clamps which prevent all
R movement. Some hoses between rigid connections must move
R longitudinally. In this case, use clamps of a type which will not
R cause wear on the hose casing. You must attach the connections at
R the rigid part, not a the hose.
R NOTE : When the lines have rigid tubes, wind Teflon tape around the
R hose after protection.
R (e)If necessary for repair, install the applicable fittings on the ends
R of the tubes to connect the flexible hose assembly. Obey the
R installation rules related to the flexible hoses. Make sure that the
R fittings to be installed on the tubes are compatible with the fittings
R on the flexible hose assembly. For MS 21922 sleeve installation, refer
R to the repair procedure with a MS 21922 sleeve in this task.
R (5)Temporary Repair Procedure of a Flexible Hose with Flexible Spare Hose
R (connected to a part or equipment with a fixed position).

R A temporary repair of a flexible hose with a flexible spare hose
R connected to a part or equipment with a fixed position has a life
R limited to 20 takeoffs.
R This life limit can be extended to 1000 flight hours or 750 flight
R cycles, whichever comes first, if there is no other line
R temporary-repair on the three hydraulic systems, with an inspection
R as follows:
R - first inspection after first flight,
R - further inspections at weekly intervals.
R (a)Installation conditions.
R 1 A temporary repair with a flexible spare hose is permitted on two
R hydraulic systems if there is no hydraulic line temporary-repair on
R the third hydraulic system.
R 2 A temporary repair with two or more flexible hoses end-to-end is
R permitted if:
R - the repair is on one flexible hose pipe only,
R - only standard fittings are installed between the flexible spare
R hoses (if needed) (Ref. Fig. 047).
R (b)Operational conditions:
R 1 If there is additional hydraulic line temporary-repair on one of the
R three hydraulic systems it is mandatory to:
R - replace the temporary repair (flexible hose) by a permanent repair
R after 20 takeoffs,
R - do a daily inspection of the repair to make sure that it is in the
R correct condition.
R 2 If there is no additional hydraulic line temporary-repair on the three
R hydraulic systems it is mandatory to:
R - replace the temporary repair (flexible hose) by a permanent repair
R at 10000 flight hours or 750 flight cycles, whichever comes first,
R - do the first inspection of the repair after the first flight to
R make sure that it is in the correct condition, and do further
R inspections at weekly intervals.
R 3 If possible, attach the flexible spare hose to an adjacent pipe or
R other hose with ty-wraps and spacers (Ref. 20-23-14, P. Block 001)
R to prevent chafing with the adjacent structure. If there is a risk
R of chafing between the hose and the structure/component, install a
R chafe guard on the related seciton of the hose.
R (c)The flexible spare hose that you use must:
R - at minimum, be specified for use with the operation pressure in the
R system,
R - be specified for use with the type of fluid used in the system,
R - have, at least, the same inside diameter as the damaged flexible
R hose,
R - have sufficient length to replace the damage flexible hose.
R (d)Obey these installation rules:
R 1 The flexible spare hose must have an over length or a curve to make
R an allowance for length variations due to pressure.
R The hose length changes:
R - from +2 to -2.9% for a moderate pressure,
R - from +2 to -2% for a high pressure.
R 2 There must be no flexure at the fittings. The hose must be straight

for at least two hose diameters from the fitting.

3 Obey the minimum bend radius of the hose (Ref. Fig. 049).
To prevent sharp bends in the hose assembly, use:
- elbow fittings,
- hose with elbow-type end fittings.

4 When you install the hoses, you must not twist them. This can cause the hose to break or the attachment nuts to become loose. The use of swivel connections at one end or at the two ends will prevent twist stresses.

5 In all operation conditions, there must be clearance between the hose assemblies and:
- the other lines,
- the adjacent structure,
- the equipment.

Hose minimum clearances must be as follows:

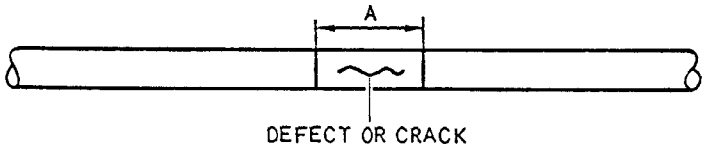
HOSE CLEARANCE TO	MINIMUM CLEARANCE INCH (mm)
CONTROL CABLES AND LINKAGES	1.0 (25.4 mm)
CABLE AT PULLEYS	0.5 (12.7 mm)
CABLE AT MIDDLE OF SPAN	2.0 (50.8 mm)
ELECTRICAL WIRING	0.5 (12.7 mm)
HYDRAULIC TUBES	0.2 (5 mm)
HOSES (2 SYSTEMS)	0.4 (10 mm)
HOSES (1 SYSTEM)	0.2 (5 mm)

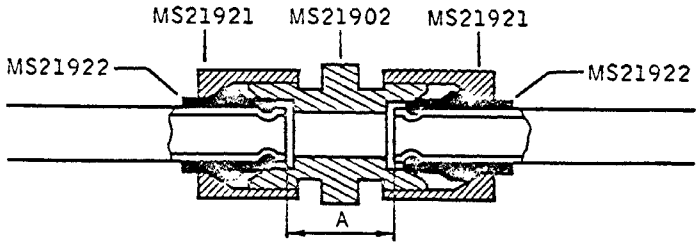
6 When you install the hose assembly supports, make sure that they do not cause distortion of the rigid lines (this can occur when the lines and hoses move in relation to each other). Use a correct number of clamps so that the lines are correctly routed along the contour of the structure. This prevents abrasive wear, kinks and entanglement during flexure. You must install clamps, at a minium, at locations where the flexible hose clamps were. You must not attach hoses around their outside diameters with tight, rigid clamps which prevent all movement. Some hoses between rigid connectios must move longitudinally.
In this case, use clamps of a type which will not cause wear on the hose casing. You must attach the connections at the rigid part, not a the hose.
NOTE : When the lines have rigid tubes, wind Teflon tape around the hose after protection.

(e)If necessary for repair install the applicable fittings on the ends of the tubes to connect the flexible hose assembly. Obey the installation

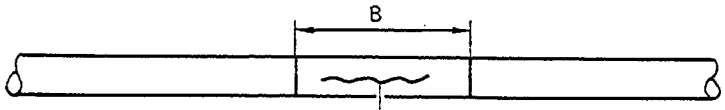
R rules related to the flexible hoses. Make sure that the fittings to be
R installed on the tubes are compatible with the fittings on the flexible
R hose assembly. For MS 21922 sleeve installation, refer to the repair
R procedure with a MS 21922 sleeve in this task.
R (6)Put the aircraft back to its initial configuration.
R (a)Do the applicable bleeding procedure (Ref. TASK 29-00-00-910-80400).
R (b)Pressurize the aircraft hydraulic system to nominal pressure and do a
R check for leaks.
R (c)Make sure that the work area is clean and clear of tools and other
R items.

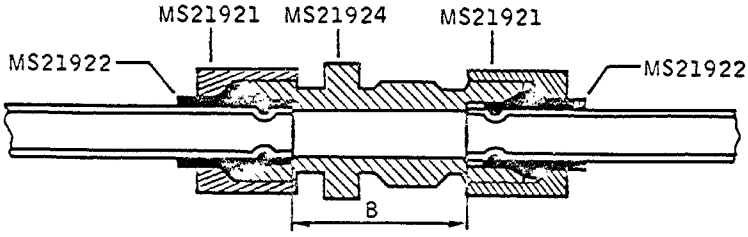
TYPE A REPAIR SET-UP





TYPE B REPAIR SET-UP





TUBE DIA	mm	6,35	7,94	9,52	12,70	15,87	19,05	25,40	38,10
	in	1/4	5/16	3/8	1/2	5/8	3/4	1	1 1/2
DIM A	mm	15,6	14,8	18,0	20,0	22,4	27,2	23,9	20,4
	in	0.61	0.58	0.71	0.71	0.88	1.07	0.94	0.80
DIM B	mm	30,7	30,7	33,5	36,6	39,9	45,8	42,1	38,6
	in	1.21	1.21	1.32	1.44	1.57	1.80	1.66	1.52

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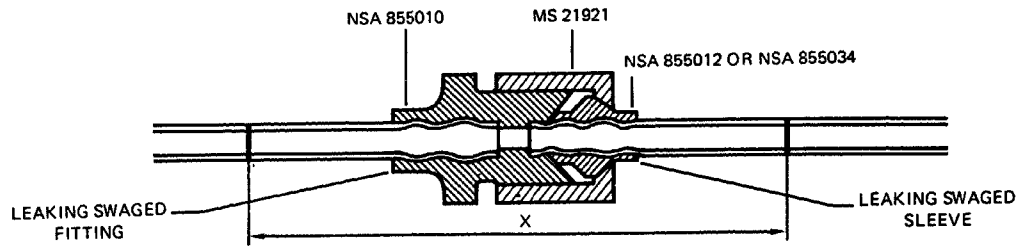
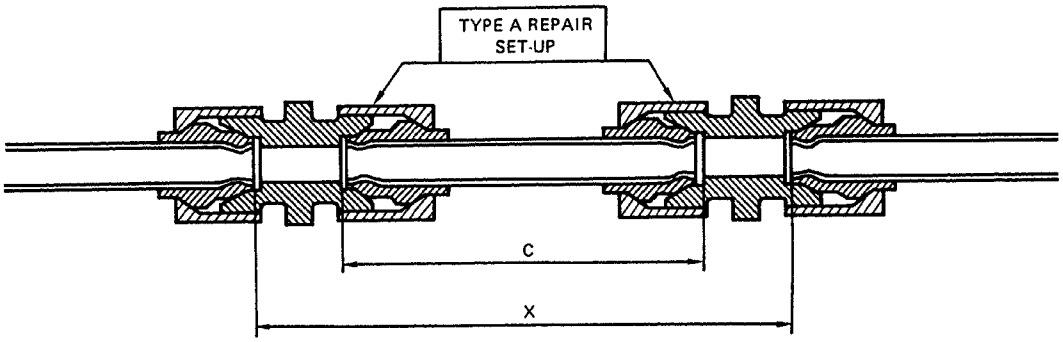
Straight Tube Section Repair
Figure 050

BEFORE





AFTER

TUBE DIA	mm	6.35	7.94	9.52	12.70	15.87	19.05	25.40	38.10
	in	1/4	5/16	3/8	1/2	5/8	3/4	1	1 1/2
DIM C	mm	40	46	51	56	59	59	65	67
	in	1.57	1.81	2.00	2.20	2.32	2.32	2.56	2.64
DIM X	mm	71.2	75.6	87	96	103.8	113.4	112.8	107.8
	in	2.80	2.98	3.42	3.78	4.09	4.46	4.44	4.24

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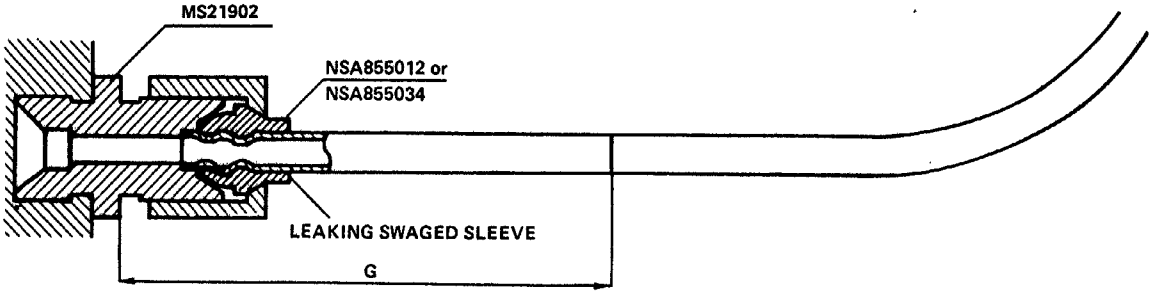
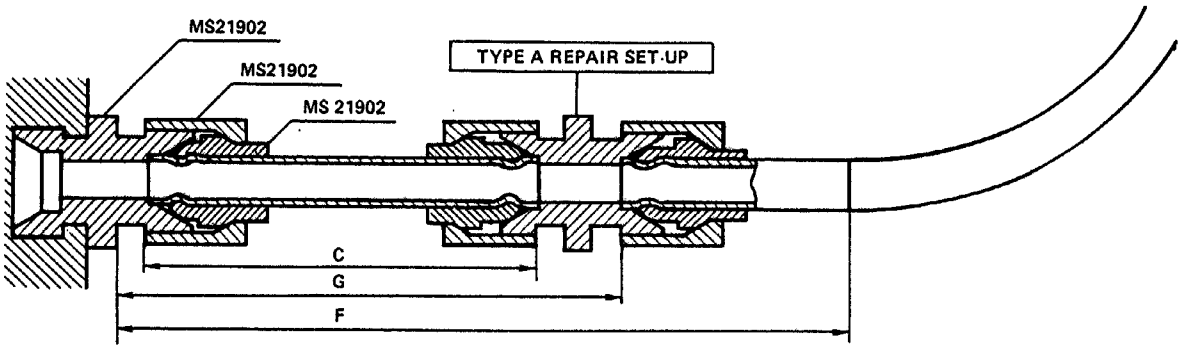
Repair of Union
Figure 051

BEFORE



AFTER



TUBE DIA	mm	6.35	7.94	9.52	12.70	15.87	19.05	25.40	38.10
	in	1/4	5/16	3/8	1/2	5/8	3/4	1	1/2
DIM C	mm	40	46	51	56	59	59	65	67
	in	1.57	1.81	2.00	2.20	2.32	2.32	2.56	2.64
DIM F	mm	81	89	100	110	117	124	129	128
	in	3.19	3.56	3.94	4.33	4.61	4.88	5.08	5.04
DIM G	mm	61.2	66.0	74.6	82.3	88.4	94.8	95.8	92.6
	in	2.41	2.60	2.94	3.24	3.48	3.73	3.77	3.64

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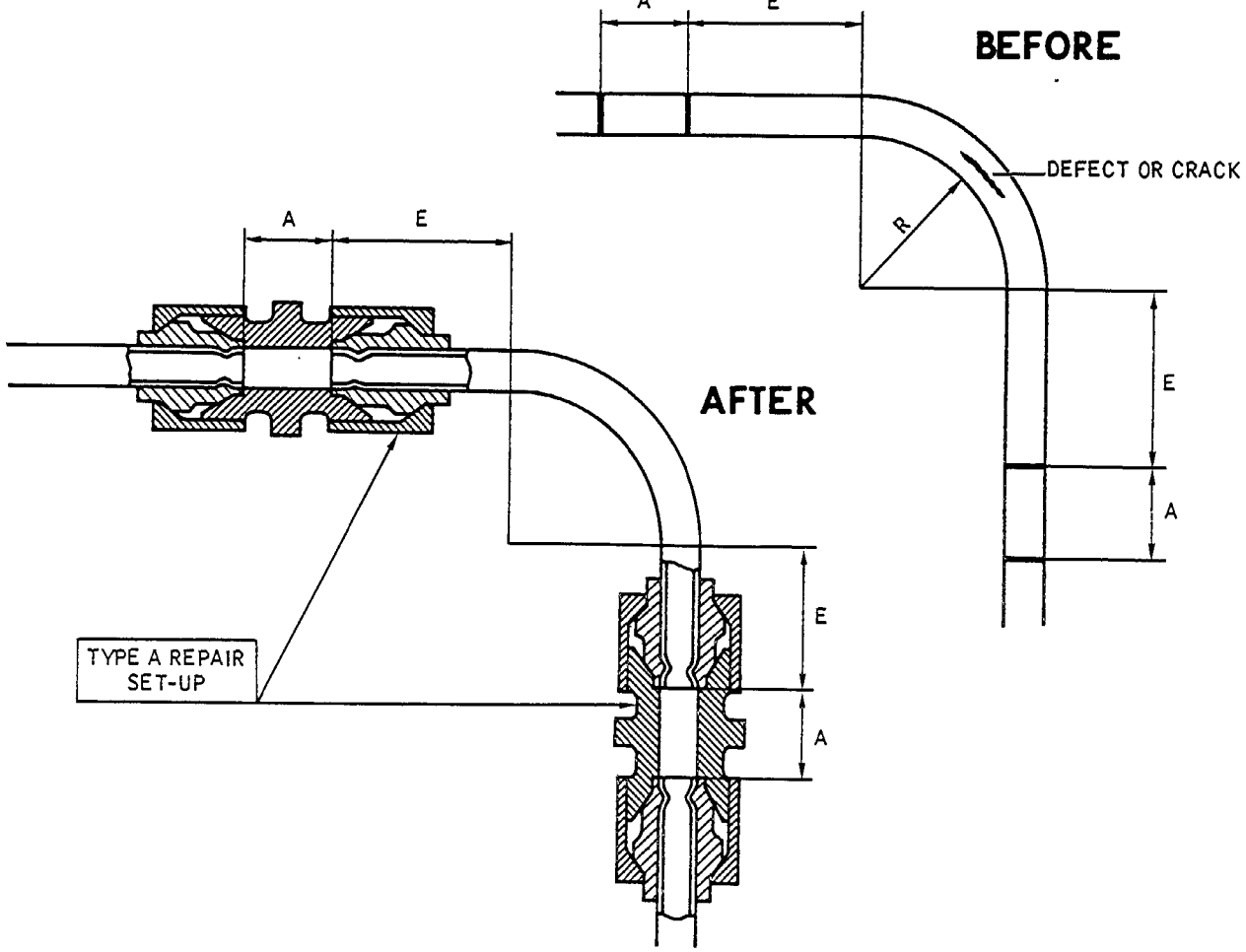
Tube End Repair
Figure 052



TUBE DIA	mm	6.35	7.94	9.52	12.70	15.87	19.05	25.40	38.10
	in	1/4	5/16	3/8	1/2	5/8	3/4	1	1 1/2
DIM A	mm	15.6	14.8	18.0	20.0	22.4	27.2	23.9	20.4
	in	0.61	0.58	0.71	0.79	0.88	1.07	0.94	0.80
DIM E	mm	20	23	25	28	29	29	33	35
	in	0.79	0.90	0.98	1.10	1.14	1.14	1.30	1.38

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Elbow Repair
Figure 053

G. Repair of the Hydraulic Tubes with CRYOFIT Couplings 3PHS111-XX

(1)Equipment and Materials

ITEM	DESIGNATION
(a)	Chipless Roller - Type Cutter
(b)	Deburring Tool
(c)	Scotch-Brite Pad
(d)	Stop-Watch
(e)	CRYOFIT Installation Tooling
(f)	Grade 400 Emery Cloth
(g)Material No. 11-003	Cleaning Agents
(h)Material No. 13-002	Pretreatment for Painting
(i)Material No. 16-001C	Structure Paints
(j)Material No. 16-020	Structure Paints
Referenced Procedures	
- 12-12-29, P. Block 1	Hydraulics
- 29-10-00, P. Block 301	Hydraulic Power - Main
- 29-14-00, P. Block 301	Hydraulic Reservoir Pressurizing System
- 29-00-00, P. Block 401	General - Removal/Installation
- 29-00-00, P. Block 301	Hydraulic Power
- 32-42-00, P. Block 301	Braking
- 32-43-00, P. Block 301	Standby Braking

(2)Safety precautions

(a)For installation of CRYOFIT couplings you must use small quantities of liquid nitrogen.

1 Liquid nitrogen is :
- very cold -196 deg.C (-320.80 deg.F)
- non-toxic
- non-corrosive
- non-flammable
- a poor electrical conductor.

2 You must obey these precautions when you use CRYOFIT couplings and liquid nitrogen :
- keep the couplings and the liquid nitrogen in a correct container (work box)
- do the work in an area with a good flow of air
- prevent long contact with the skin
- wear gloves as shown in this procedure when you touch cold parts
- do not put gloved hands into liquid nitrogen
- wear safety glasses
- use correct tools.

3 If liquid nitrogen spills :
- stay clear of the spilled liquid. It will very rapidly evaporate
- immediately remove any clothing or shoes soaked with liquid nitrogen
- flush your skin with warm water and immediately get medical aid if the liquid nitrogen burns you

- if the liquid nitrogen goes in your eyes, flush them with water and immediately get medical aid.

(b)Obey the safety procedures of the hydraulic system (Ref. 29-00-00, P. Block 301).

(c)Make sure that the hydraulic reservoirs and the hydraulic systems are depressurized (Ref. 29-10-00, P. Block 301) and (Ref. 29-14-00, P. Block 301).

(3)Equipment (Ref. Fig. 054)

(a)CRYOFIT installation tooling

For installation of CRYOFIT couplings, you must use the tools below :

- a work box to put the parts fully into liquid nitrogen
- a pair of gloves to touch the cold parts
- a marking pen to make the installation marks on the tubes
- tongs to remove the parts from the liquid nitrogen
- applicable tube chillers to make the tubes cold before the installation of the couplings
- applicable snap-on couplings or O-rings to stop the movement of the coupling (installation stop)
- applicable marking gages to make the installation marks
- applicable test couplings for the check of the tube joints
- applicable extended time tools to increase the recovery time of the coupling.

(b)Coupling assembly - 3PHS111-XX

1 Before you start the installation, make sure that you use the correct coupling assembly (Ref. Fig. 055).

(4)Installation clearance

(a)Installation package clearance (Ref. Fig. 056)

1 You must have sufficient clearance to remove the installation package after the installation of the coupling.

(b)Radial clearance (Ref. Fig. 057)

1 The clearance around the CRYOFIT coupling installations must be sufficient for the removal of the installation package.

NOTE : If you use the extended time tool, the clearance must be greater because the extended time tool has a larger outer diameter. You can use a test coupling and an installation package or an extended time tool to do a check of the clearance.

(c)Axial clearance

The necessary axial clearance and length of straight tube (without deformation) will change with the coupling size and the installation technique used.

The length of tube engaged in each end of the coupling must be equal to half the length of the coupling.

To put the coupling in position, you can :

- move the tube axially (if possible)
- move the tube laterally (deflection).

1 Installation of the coupling by axial movement of the tube (Ref. Fig. 058)

To do this procedure:

- axially pull one tube away from the other until you can put the coupling in position

- put the coupling in position on one tube
- engage the other tube in the coupling.

NOTE : For this procedure:
- you must have a minimum length of straight tube (1/2 the coupling length for each tube end)
- it must be possible to move the tube axially.

2 Installation of the coupling by lateral movement (deflection) of the tube (Ref. Fig. 059)
This is an alternative to the axial movement procedure.
To do this procedure:
- move the tube to one side
- put the coupling on the moved tube
- put the tube back in position
- engage the coupling on the other tube until the coupling is in the correct installation position.

NOTE : For this procedure :
- axial movement of the tube is not necessary
- you must have a length of straight tube (without deformation) on one end equal to the full length of the coupling.

(d)Tube bend location

1 Tube bends prevent movement of the coupling. The coupling can be against a bend (or a bump) if you have sufficient clearance to install the coupling correctly.

(e)Increase in assembly dimension (growth)

1 When a CRYOFIT coupling decreases (shrinks) in diameter, its length increases and moves the two tubes apart.
You must think about this when you make the decisions about the coupling installation procedure (tube lengths, bend locations, bumps).

2 Calculated increase in length (growth) after assembly

Tube Size	Tube DIA		Aluminum, stainless steel	
	in.	mm	in.	mm
-04	1/4	6.35	.016	0.40
-06	3/8	9.525	.020	0.50
-08	1/2	12.70	.026	0.66
-10	5/8	15.875	.034	0.86
-12	3/4	19.050	.037	0.94
-16	1	25.4	.040	1.02
-20	1-1/4	31.750	.045	1.14
-24	1-1/2	38.10	.059	1.50

(5)Preparation for coupling installation
(a)Put marks on the tube where you will cut the tube to remove the damaged part. When you put the marks on the tube, think about:
- access for the tube cutter and the CRYOFIT couplings
- where to release the tube. For installation of the coupling, a minimum of one tube end must be free to move
- possible future problems and a new routing of the tube (where permitted) to prevent chafing or contact with parts that move
- drainage of hydraulic fluid
- sufficient straight length of tube after removal of the damaged part
- minimum splice length (Ref. Fig. 060)
- assembly growth
- removal and replacement of paint or other protections on the tube adjacent to the repair.

(b)If possible, drain the line near the location of the repair.
(c)Cut the tube and remove the damaged part. A chipless roller-type cutter is recommended.
(d)Make sure that the tube ends are free of burrs (inner side and outer side). Deburr if necessary. Use an applicable deburring tool to prevent damage or contamination of the fluid system.
(e)Preparation of the painted tube ends
1 It is necessary to remove paint over one coupling length at the ends of the painted tube:
- remove paint with Grade 400 emery cloth over one coupling length at the ends of the painted tube. Make sure that you do not scratch the tube when you remove the paint.

(f)Cut, deburr and remove paint from all tubes you will use to replace the damaged part of tube.
(g)Make sure that all the tube ends are in the correct condition and agree with the tube dimension specifications.
(h)Clean all the tube ends with a lint-free cotton cloth and cleaning agent (Material No. 11-003).
NOTE : Make sure that the cleaning agent does not go in the tube.

(6)Coupling installation (Ref. Fig. 061)
NOTE : To install all CRYOFIT couplings, you do these steps:
- attach one side of the tube joint
- move the other side
- slide the coupling over one of the tube ends
- align the tubes
- move the coupling back over the joint and allow it to recover.

(a)Loosen the tube clamps on one side of the joint to permit the movement of one of the tubes. If possible, the other tube must stay attached.
NOTE : Make sure that:
- bulkhead fittings and reconnectable fittings on the same tube run (or on a branch run) are installed before you install the CRYOFIT coupling
- bulkhead fitting jam-nuts are torqued to the correct value
- reconnectable fittings are hand tightened.

(b)Do a check of all the joints with a test coupling.

1 With the applicable test coupling, do a check for burrs, tube alignment, tube gap and tube roundness.
NOTE : The coupling has a 0.03 in. (0.7619 mm) hole (window) in its center, which is the maximum permitted tube gap.
NOTE : The test coupling must move freely on the joint when the tubes are aligned. Do not try to force the tubes to align with the coupling because this will cause stress in the tubing system.

(c)Mark the tubes.
1 Put the applicable marking gauge on each tube end. With the marking pen, color the rectangular box. These 0.03 in. (0.7619 mm) marks will be the installation marks.

(d)Install the installation stop.
1 On the tube you do not move, put one end of the applicable snap-on coupling in the middle of the installation mark. The snap-on coupling will be the installation stop.
NOTE : As an alternative, you can use an applicable O-ring as an installation stop. Use the test coupling to put the O-ring in the correct position on the installation mark (perpendicular to the tube axis).
NOTE : You can also use the snap-on coupling to hold the tubes aligned while you do the tube set-up.

(e)Decrease the temperature (chill) the installation tools.
1 Place the end of the tongs, the applicable tube chiller, and the applicable extended time tool in the workbox.
2 Keep the tools in the liquid nitrogen until the boiling stops.

(f)Simulate and measure the time necessary for the installation.
1 With the test coupling, simulate the installation until you can do it easily. Make sure you know the obstructions that can prevent easy installation.
2 When you can do the installation easily, simulate the installation again, and measure the time necessary for the installation with a stop-watch.
3 Compare the time necessary to simulate the installation with the installation times given in the table.
If the time necessary to simulate the installation is more than the recovery time, use the extended time tool.
Recovery time after tube chilling

Tube Size	Tube DIA in.	Tube DIA mm	Aluminum seconds	Stainless steel seconds
-04	1/4	6.35	30	45
-06	3/8	9.525	25	60
-08	1/2	12.70	22	75
-10	5/8	15.875	21	70
-12	3/4	19.050	20	62

Tube Size	Tube DIA in.	Tube DIA mm	Aluminum seconds	Stainless steel seconds
-16	1	24.400	20	50
-20	1-1/4	31.750	20	50
-24	1-1/2	38.100	20	50

NOTE : The recovery times in this table are for the couplings in the plastic installation package. You can increase these times if you use the extended time tool. For repairs that add a length of new tube (splice), you can decrease the temperature (chill) of the new tube before you start the installation. This will give you more time for the installation of the first coupling.

(g)Chill the tubes.

1 Refer to the table below to find the correct chilling time for the tube type and the tube size.

Tube chilling time

Tube Size	Tube DIA in.	Tube DIA mm	Aluminum seconds	Stainless steel seconds
-04	1/4	6.35	40	40
-06	3/8	9.525	40	50
-08	1/2	12.70	40	60
-10	5/8	15.875	50	80
-12	3/4	19.050	70	110
-16	1	24.400	110	160
-20	1-1/4	31.750	150	180
-24	1-1/2	38.100	150	180

(h)Install the coupling.

1 If you use the CRYOFIT couplings with plastic installation packages (as supplied pre-assembled from the factory):

- Put on the gloves.
- With the pre-chilled tongs, remove the coupling from the workbox.
- Hold the coupling with gloved fingers.
- Move the coupling on the tube end that does not have the installation stop.
- Align the tubes.

- Move the coupling back on the joint against the installation stop.

2 If increased recovery time is necessary, you must put the coupling in the extended time tool:
- Put on the gloves.
- With the pre-chilled tongs, remove the coupling from the workbox and remove the plastic installation package. Put the coupling back in the workbox.
- With the tongs remove the pre-chilled extended time tool from the workbox and put it in your free gloved hand.
- Squeeze the tabs to open the jaws.
- Hold the extended time tool over the workbox, hold the coupling with the tongs and put it in the jaws (of the extended time tool).
- Carefully let the extended time tool fall back in the workbox. When the extended time tool is ready for installation (boiling stopped):
  . with the tongs, remove the extended time tool coupling from the workbox
  . hold the tool with gloved fingers
  . move the tool on the tube end that does not have the installation stop
  . align the tubes
  . move the tool back on the joint against the installation stop.

(i)Remove the installation tool.
1 Let the coupling recover.
2 Remove the plastic installation package or the extended time tool.

(j)Do a visual check.
1 Make sure that the two ends of the coupling touch the installation marks. If the two ends of the coupling are not on the installation marks, the repair is not satisfactory. To make the repair satisfactory you can:
- cut out the coupling
- install a small length of new tube with two couplings (splice).

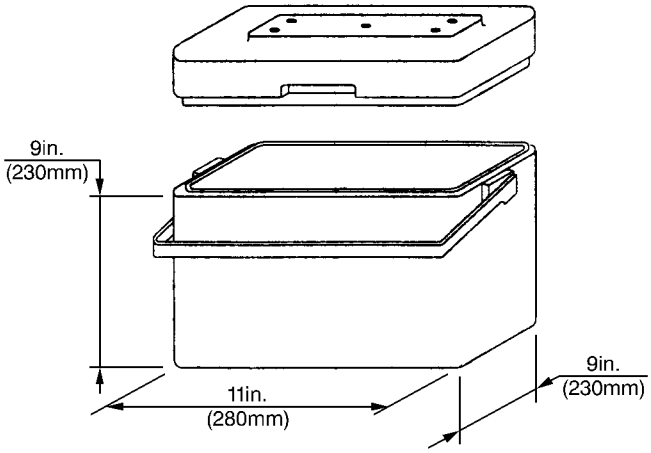
(7)Put the aircraft back to its initial configuration.
(a)Pressurize the related hydraulic reservoirs (Ref. 29-14-00, P. Block 301).
(b)If necessary, fill the related hydraulic reservoirs (Ref. 12-12-29, P. Block 1).
(c)Pressurize the related hydraulic systems (Ref. 29-10-00, P. Block 301).
(d)Make sure that there is no leakage in the repaired area.
(e)Bleed the related hydraulic system (Ref. 29-00-00, P. Block 401) (Ref. 32-42-00, P. Block 301) (Ref. 32-43-00, P. Block 301).
(f)If applicable, restore the protection on the repaired tube.
1 For aluminum tubes:
- Apply Material No. 13-002 on the bare metal of the tube with a brush.
- Finish the protection with Material No. 16-001C.

2 For CRES tube (if painted):
- Rub the bare metal with scotch-brite pad.
- Apply Material No. 16-020 on the bare metal of the tube.

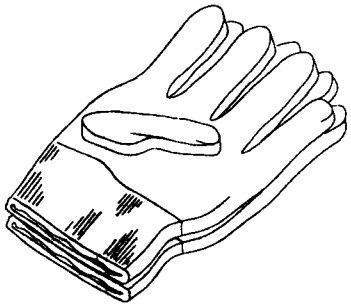
- Finish the protection with Material No. 16-001C.

(8) Make sure that the work area is clean and clear of tool(s) and other items.

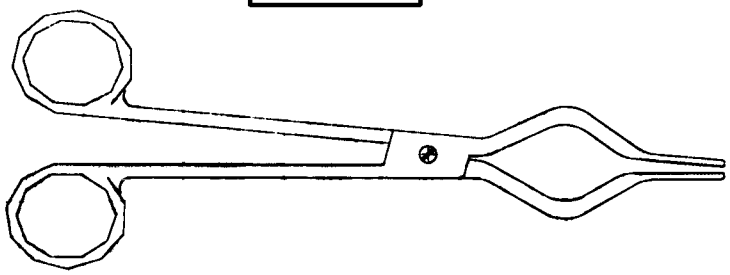
WORK BOX REFERENCE
WB910825-01



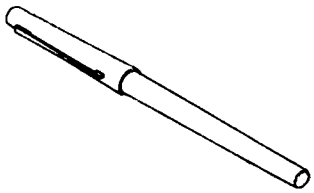
GLOVES REFERENCE
OE-GLOVES-SMALL
OE-GLOVES-MEDIUM
OE-GLOVES-LARGE



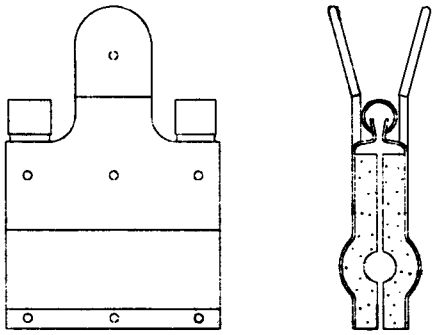
TONGS REFERENCE
TONGS-SS-81N



MARKING PEN REFERENCE
911685



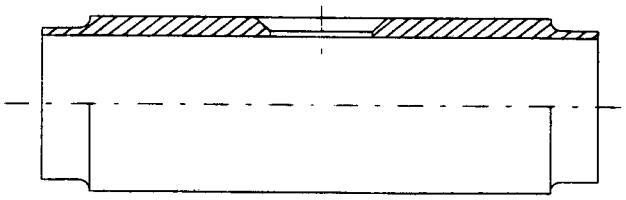
TUBE CHILLER REFERENCE	TUBE SIZE
910415-01	-04 THRU -08
910415-02	-10 THRU -14
910415-03	-16 AND LARGER



BM5 20 23 11 0 KAMA 00

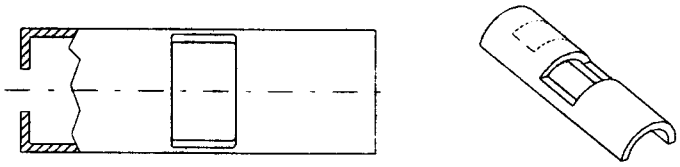
CRYOFIT Installation Tooling
(Sheet 1/3)
Figure 054

TEST COUPLING



TEST COUPLING REFERENCE	TUBE SIZE	TUBE DIA. in.	TUBE DIA. mm
TC3PHS111-04	-04	1/4	6.35
TC3PHS111-06	-06	3/8	9.525
TC3PHS111-08	-08	1/2	12.7
TC3PHS111-10	-10	5/8	15.875
TC3PHS111-12	-12	3/4	19.050
TC3PHS111-16	-16	1	25.4
TC3PHS111-20	-20	1-1/4	31.750
TC3PHS111-24	-24	1-1/2	38.10

MARKING GAUGE

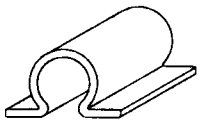


MARKING GAUGE REFERENCE	TUBE SIZE	TUBE DIA. in.	TUBE DIA. mm
MG3PHS111-04	-04	1/4	6.35
MG3PHS111-06	-06	3/8	9.525
MG3PHS111-08	-08	1/2	12.7
MG3PHS111-10	-10	5/8	15.875
MG3PHS111-12	-12	3/4	19.050
MG3PHS111-16	-16	1	25.4
MG3PHS111-20	-20	1-1/4	31.750
MG3PHS111-24	-24	1-1/2	38.10

BM5 20 23 11 0 KAMC 00

CRYOFIT Installation Tooling
(Sheet 2/3)
Figure 054

SNAP-ON COUPLING
INSTALLATION STOP

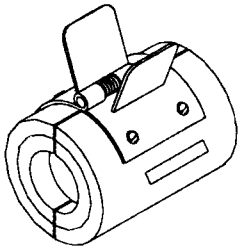


SNAP-ON COUPLING REFERENCE	TUBE SIZE	TUBE DIA. in.	TUBE DIA. mm
SC4/5PHS111-04	-04	1/4	6.35
SC4/5PHS111-06	-06	3/8	9.525
SC4/5PHS111-08	-08	1/2	12.7
SC4/5PHS111-10	-10	5/8	15.875
SC4/5PHS111-12	-12	3/4	19.050
SC4/5PHS111-16	-16	1	25.4
SC4/5PHS111-20	-20	1-1/4	31.750
SC4/5PHS111-24	-24	1-1/2	38.10

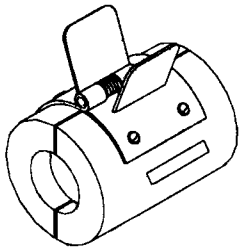
O-RINGS
INSTALLATION STOP

O-RING REFERENCE	TUBE SIZE	TUBE DIA. in.	TUBE DIA. mm
OS9452K-4	-04	1/4	6.35
OS9452K-6	-06	3/8	9.525
OS9452K-8	-08	1/2	12.7
OS9452K-10	-10	5/8	15.875
OS9452K-12	-12	3/4	19.050
OS9452K-16	-16	1	25.4
OS9452K-20	-20	1-1/4	31.750
OS9452K-24	-24	1-1/2	38.10

EXTENDED TIME TOOL



TYPE I



TYPE II

EXTENDED TIME TOOL REFERENCE	TUBE SIZE	TUBE DIA. in.	TUBE DIA. mm	TYPE
ETP3PHS111-04	-04	1/4	6.35	I
ETP3PHS111-06	-06	3/8	9.525	I
ETP3PHS111-08	-08	1/2	12.7	I
ETP3PHS111-10	-10	5/8	15.875	II
ETP3PHS111-12	-12	3/4	19.050	II
ETP3PHS111-16	-16	1	25.4	II
ETP3PHS111-20	-20	1-1/4	31.750	II
ETP3PHS111-24	-24	1-1/2	38.10	II

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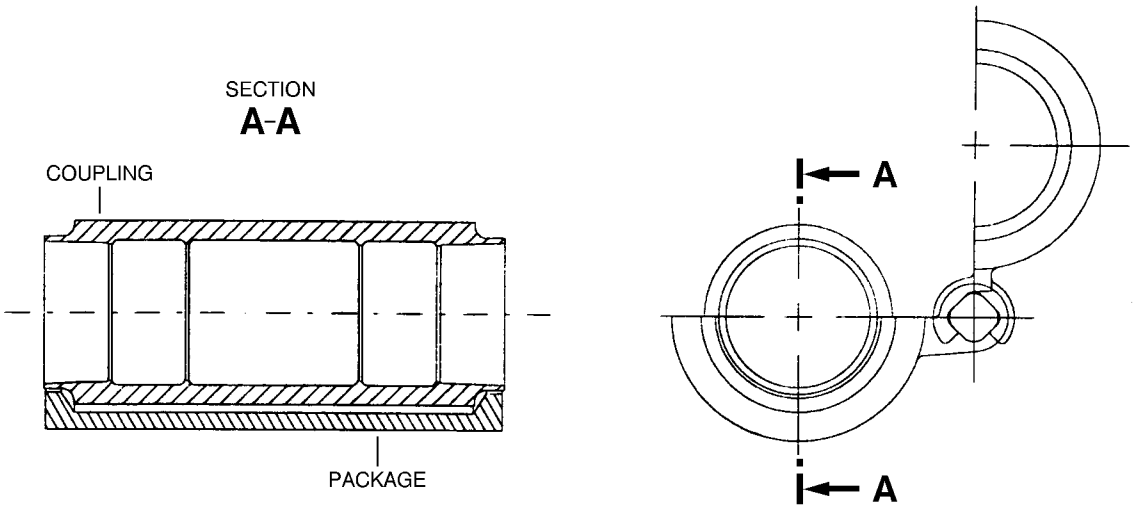
CRYOFIT Installation Tooling
(Sheet 3/3)
Figure 054



COUPLING ASSEMBLY REFERENCE	TUBE SIZE	TUBE DIA. in.	TUBE DIA. mm
3PHS111-04	-04	1/4	6.35
3PHS111-06	-06	3/8	9.525
3PHS111-08	-08	1/2	12.7
3PHS111-10	-10	5/8	15.875
3PHS111-12	-12	3/4	19.050
3PHS111-16	-16	1	25.4
3PHS111-20	-20	1-1/4	31.750
3PHS111-24	-24	1-1/2	38.10

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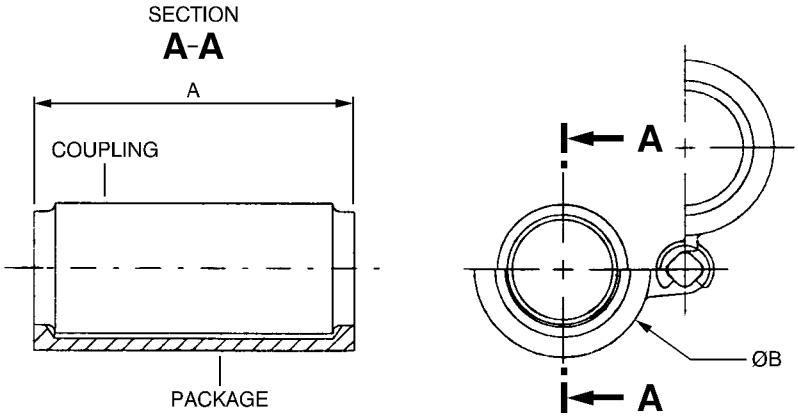
Coupling Assembly - 3PHS111-XX
Figure 055

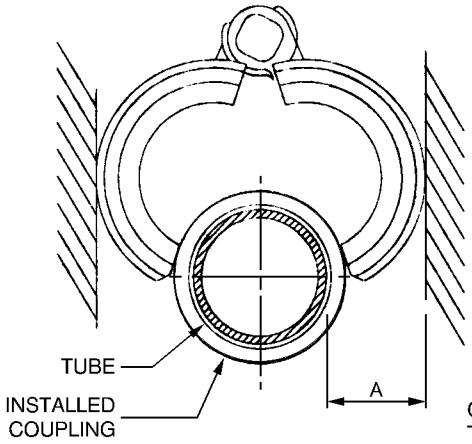


COUPLING ASSEMBLY REFERENCE	A		ØB	
	in.	mm	in.	mm
3PHS111-04	.981	25	.564	14.3
3PHS111-06	1.302	33	.714	18.1
3PHS111-08	1.604	40.7	.880	22.4
3PHS111-10	1.907	48.4	1.054	26.8
3PHS111-12	2.215	56.3	1.220	31
3PHS111-16	2.845	72.3	1.560	39.6
3PHS111-20	2.506	63.7	1.784	45.3
3PHS111-24	2.684	68.2	1.996	50.7

NOTE : PACKAGE SHOWN IN OPEN POSITION FOR ILLUSTRATION ONLY.
PACKAGE IS CLOSED FOR SHIPMENT, STORAGE AND INSTALLATION.

BM5 20 23 11 0 KCM0 00

Installation Package Clearance
Figure 056

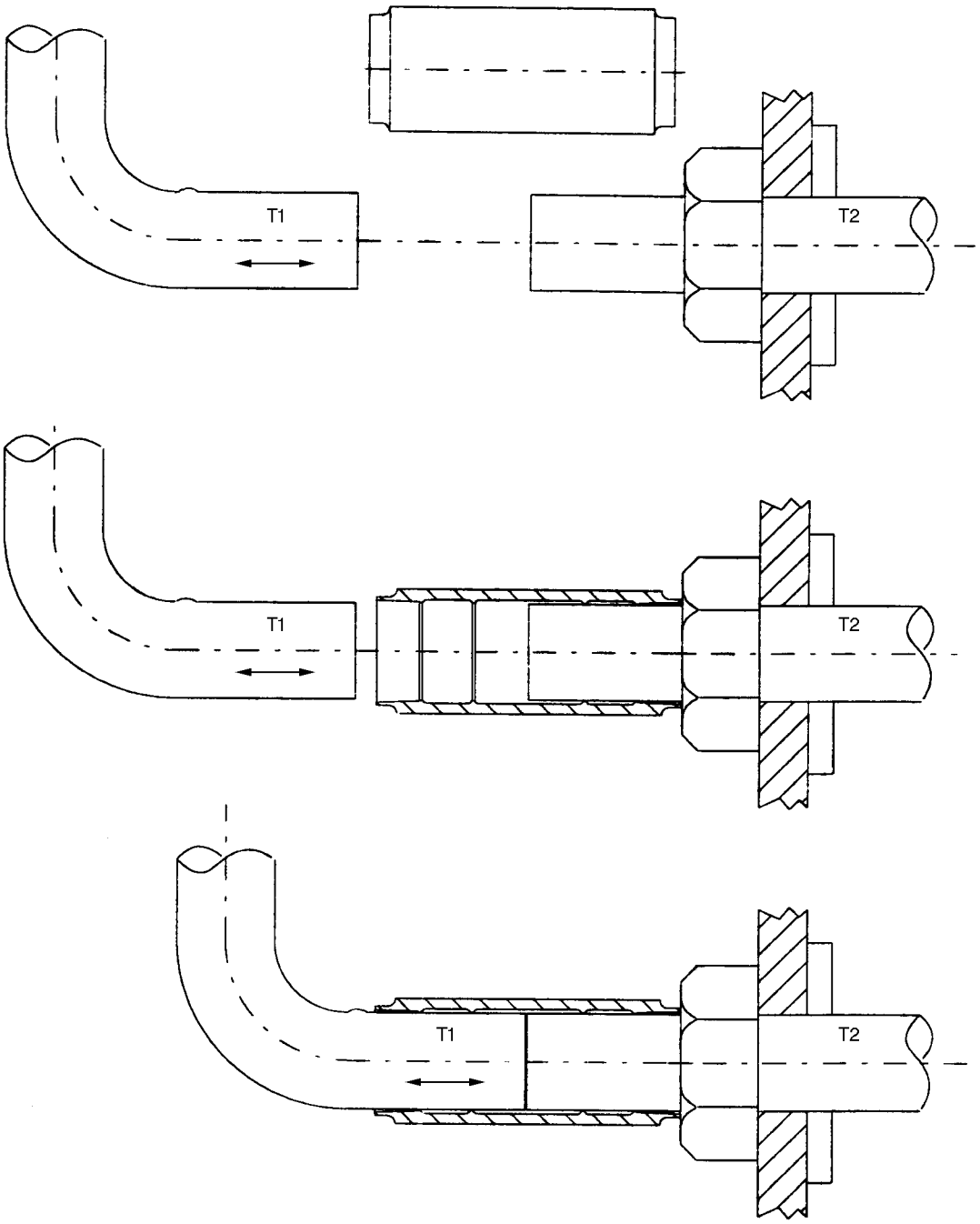


TUBE SIZE	TUBE DIA.		A			
			WITH INSTALLATION PACKAGE		WITH EXTENDED TIME TOOL	
	in.	mm	in.	mm	in.	mm
-04	1/4	6.35	.260	6.6	.382	10
-06	3/8	9.525	.311	8	.534	13.5
-08	1/2	12.7	.372	9.5	.514	13
-10	5/8	15.875	.437	11	.931	23.7
-12	3/4	19.050	.497	12.6	1.077	27.5
-16	1	25.4	.620	16	1.377	35
-20	1-1/4	31.750	.660	17	1.110	28
-24	1-1/2	38.10	.691	17.5	1.131	28.7

NOTE : MAKE SURE YOU HAVE SUFFICIENT SPACE ON ONE SIDE OF THE FITTING TO PERMIT THE ACCESS OF THE INSTALLATION PACKAGE.

BM5 20 23 11 0 KDM0 00

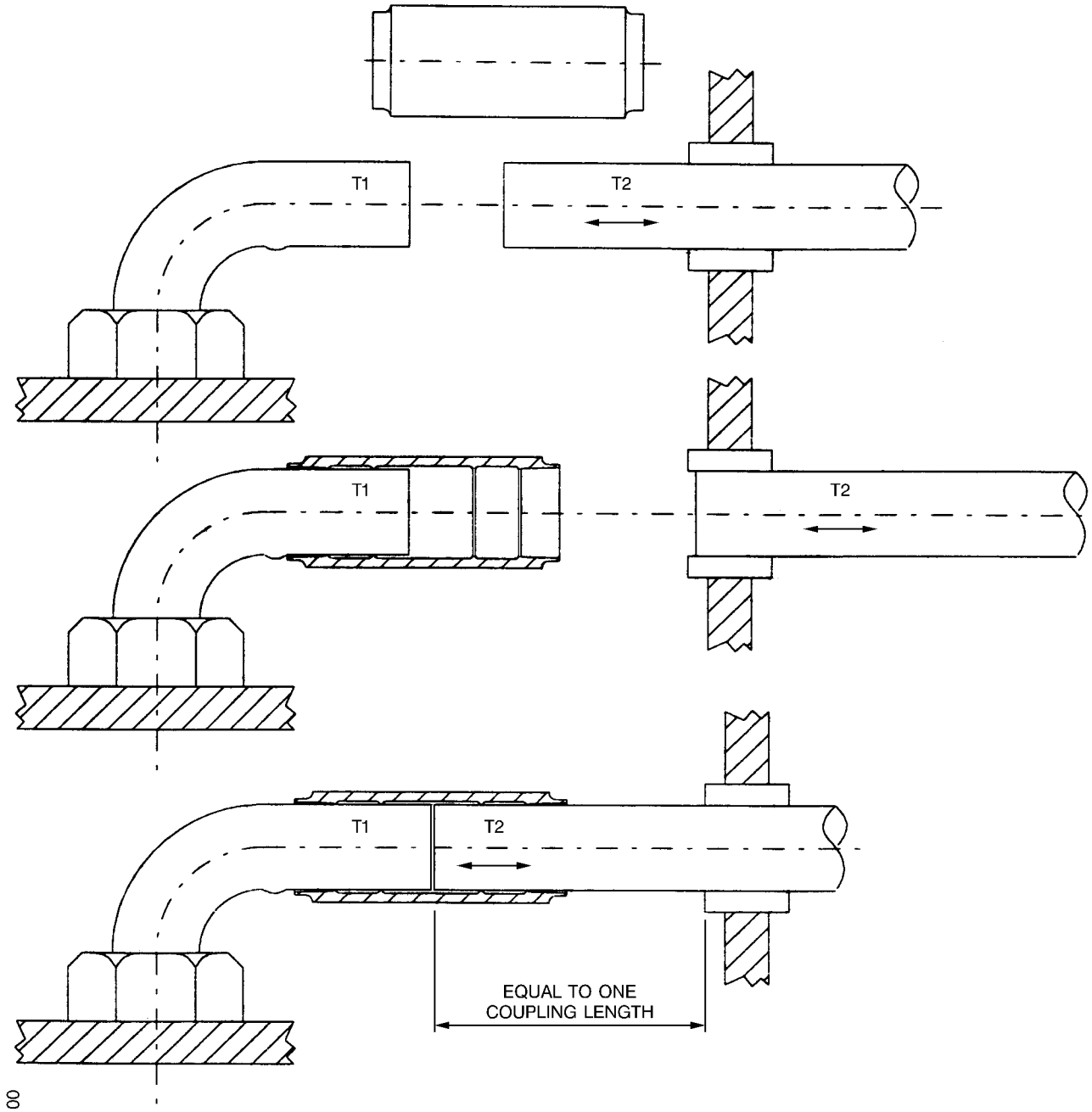
Radial Clearance
Figure 057



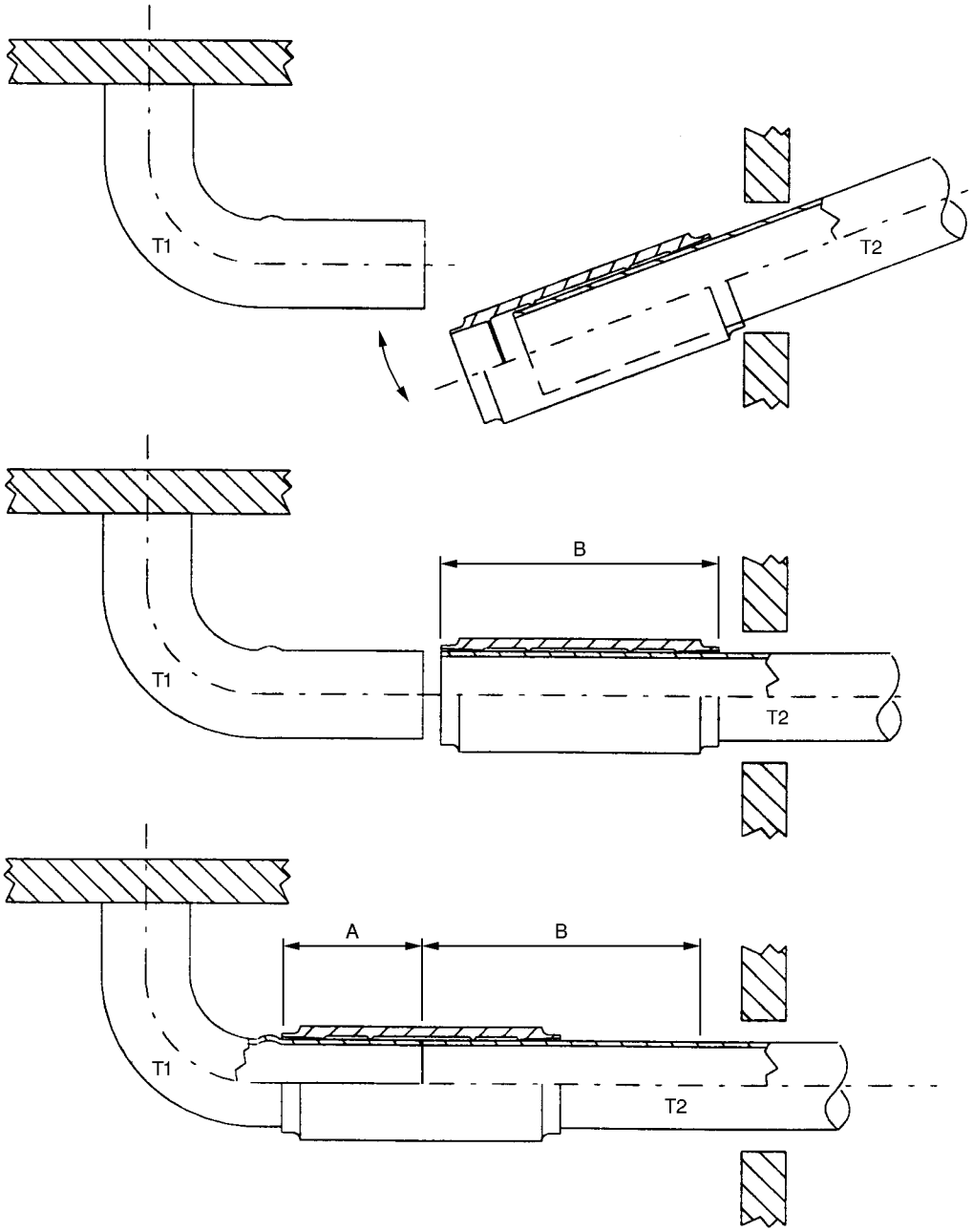
NOTE : WHERE AXIAL TUBE MOVEMENT IS PERMITTED, THE NECESSARY LENGTH OF STRAIGHT TUBE ON EACH TUBE IS EQUAL TO 1/2 OF THE COUPLING LENGTH.

BM5 20 23 11 0 KEMA 00

Axial Clearance - Axial Tube Movement
(Sheet 1/2)
Figure 058



Axial Clearance - Axial Tube Movement
(Sheet 2/2)
Figure 058

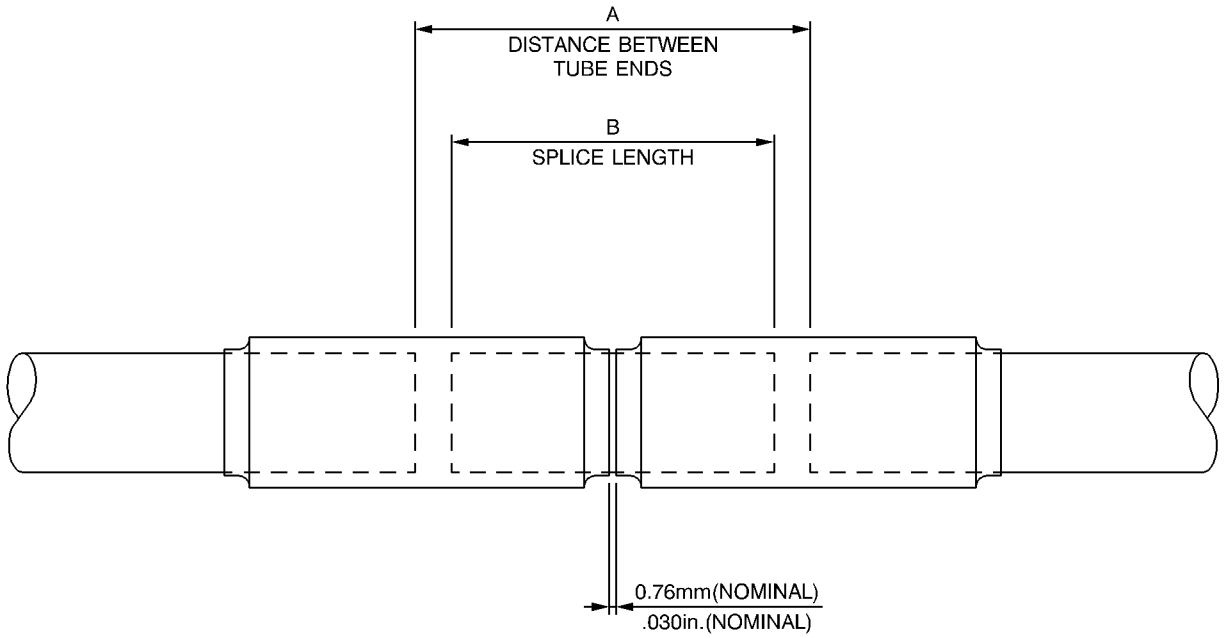


1. T1 CANNOT MOVE. T2 CANNOT MOVE AXIALLY BUT CAN MOVE LATERALLY(DEFLECTION)
2. THE LENGTH OF STRAIGHT TUBE (B) NECESSARY ON T2 IS EQUAL TO THE COUPLING LENGTH. THE LENGTH OF STRAIGHT (UNDEFORMED) TUBE (A) NECESSARY ON T1 IS EQUAL TO 1/2 THE COUPLING LENGTH.

NOTE : YOU CAN INSTALL THE COUPLING IMMEDIATELY ADJACENT TO THE BEND RADIUS OR THE BUMP.

BM5 20 23 11 0 KFM0 00

Axial Clearance - Tube Deflection
Figure 059

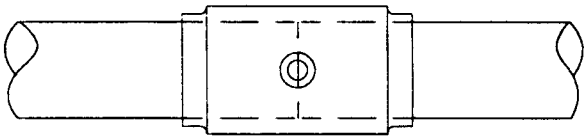


COUPLING ASSEMBLY REFERENCE	B MIN. in.	mm
3PHS111-04	.716	18.2
3PHS111-06	1.037	26.3
3PHS111-08	1.339	34
3PHS111-10	1.642	41.7
3PHS111-12	1.950	49.5
3PHS111-16	2.585	65.7
3PHS111-20	2.241	56.9
3PHS111-24	2.424	61.6

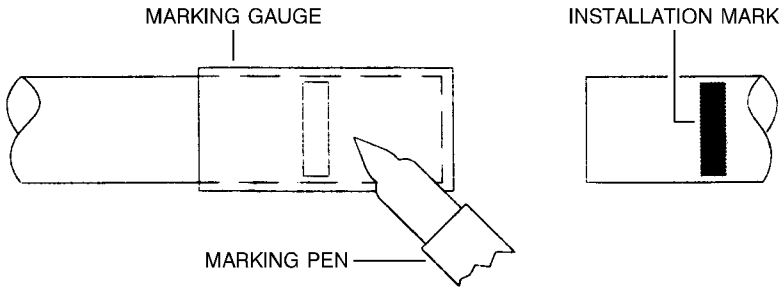
BM5 20 23 11 0 KGM0 00

Minimum Splice Length
Figure 060

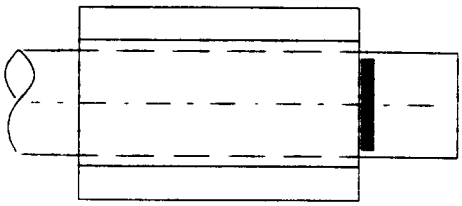
1. JOINT CHECK



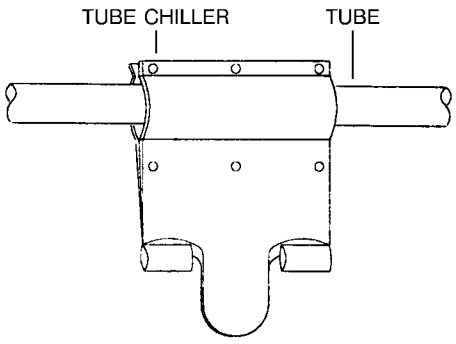
2. MARKING OF THE TUBE



3. SNAP-ON COUPLING INSTALLATION



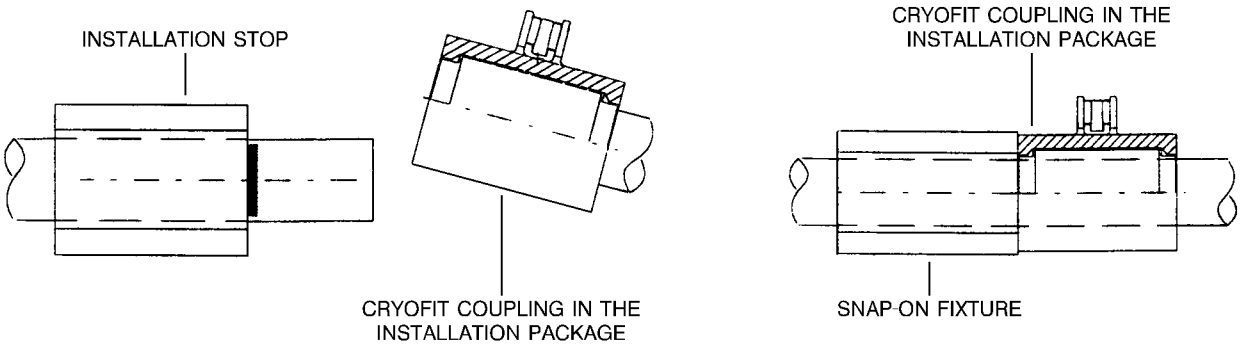
4. CHILLING OF THE INSTALLATION TOOLS AND THE COUPLING
5. CHILLING OF THE TUBES



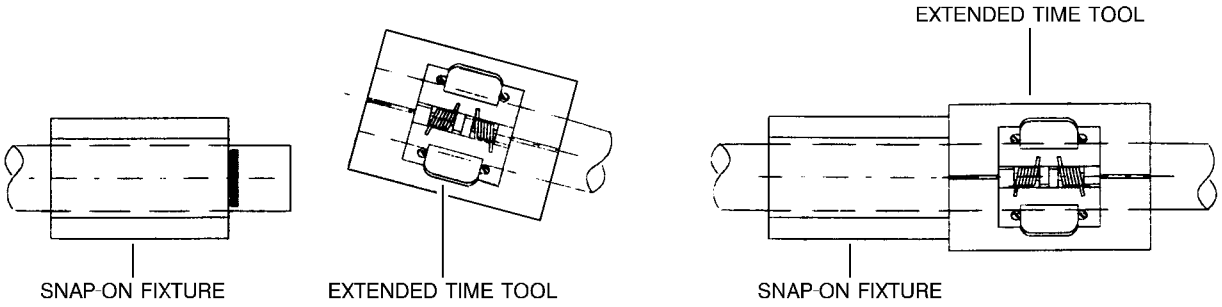
BM5 20 23 11 0 KHMA 00

Coupling Installation
(Sheet 1/2)
Figure 061

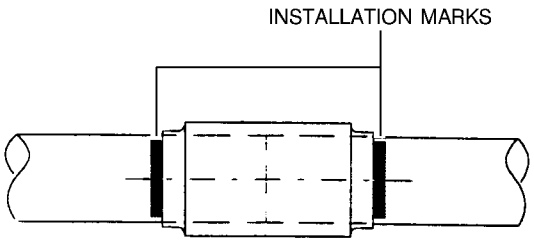
6. INSTALLATION OF THE COUPLING ASSEMBLY (WITH INSTALLATION PACKAGE)


INSTALLATION STOP
CRYOFIT COUPLING IN THE INSTALLATION PACKAGE
CRYOFIT COUPLING IN THE INSTALLATION PACKAGE
SNAP-ON FIXTURE

6A. INSTALLATION OF THE COUPLING ASSEMBLY (WITH EXTENDED TIME TOOL)



7. VISUAL CHECK



BM5 20 23 11 0 KHMC 00

Coupling Installation
(Sheet 2/2)
Figure 061

H. Repair of the Hydraulic Tubes with RYNGLOK R8 Fittings

(1)Equipment and Materials

ITEM	DESIGNATION
(a)	Chipless Roller - Type Cutter
(b)	Deburring Tool
(c)	Scotch-Brite Pad
(d)	Permanent-ink Felt-tipped pen
(e)	RYNGLOK Installation Tooling
(f)	Grade 400 Emery Cloth
(g)Material No. 11-003	Cleaning Agents
(h)Material No. 13-002	Pretreatment for Painting
(i)Material No. 16-001C	Structure Paints
(j)Material No. 16-020	Structure Paints
Referenced Procedures	
- 12-12-29, P. Block 1	Hydraulics
- 29-10-00, P. Block 301	Hydraulic Power - Main
- 29-14-00, P. Block 301	Hydraulic Reservoir Pressurizing System
- 29-00-00, P. Block 401	General - Removal/Installation
- 29-00-00, P. Block 301	Hydraulic Power
- 32-42-00, P. Block 301	Braking
- 32-43-00, P. Block 301	Standby Braking

(2)Safety precautions

(a)Obey the safety procedures of the hydraulic system (Ref. 29-00-00, P. Block 301).

(b)Make sure that the hydraulic reservoirs and the hydraulic systems are depressurized (Ref. 29-10-00, P. Block 301) and (Ref. 29-14-00, P. Block 301).

(3)Equipment

(a)RYNGLOK installation tooling (Ref. Fig. 062)

For the installation of RYNGLOK unions, you must use these tools:

1 Swage tool

NOTE : There are two types of swage tools: old generation and new generation. To swage the unions, you can use the old-generation tools or the new-generation tools.

- Old-generation swage tools
  - . RTST(X)-01-SIZE standard swage tool
    This tool pushes the union ring onto the union body to make the swage.
  - . RTST(X)R-01-SIZE reversed swage tool
    This tool pulls the union ring onto the union body to make the swage. You can use this tool to swage the unions where access is not easy (at or near a bulkhead or an adjacent fitting or when you cannot use the standard tool).
  - . RTST(X)R-51- SIZE special reversed tool
    You must use the special reversed tool where there is an opposite fitting end or forging body size larger than the dash size of the fitting end to be swaged.

This special reversed tool has a colored band and the required pressures are identified on the tool body.

- New-generation swage tool
  . **RTST(X)-02-SIZE** push/pull swage tool
    This new-generation tool replaces the standard (push) and reversed (pull) tools for easier installation especially in areas where access is not easy.

2 Pressure pump
The pump can be:
- a hand pump, **AEROQUIP P/N 10-00400A**
- a foot-operated air/hydraulic intensifier, **AEROQUIP P/N 10-00401A**
- a switch-operated air/hydraulic intensifier, **AEROQUIP P/N 10-00402.**

3 **RTSG0-51-SIZE** inspection gages
Use these tools to make sure that the swage is correct (full movement of the ring).

4 **RTSG0-01-SIZE** marking gages
Use these tools to make installation marks on the tubes.

(b)Union assemblies
Before you start the installation, make sure that you use the correct union assemblies (Ref. Fig. 063).

(4)Tubing repair (Ref. Fig. 064)

(a)Single-union repair
You can use a single-union repair if the length of the defect is in the specified limits (L max).
There are two methods for a single-union repair:
- Method 1 : You remove (cut out) the part of the tube that has the defect.
- Method 2 : You cut through the center of the defect.
  NOTE : This is not the best method because, in some conditions, the defect can cause damage to the sealing surface of the union. If you use this method, you must be careful:
  - to cut the tube in the center of the defect
  - to put the union in the center between the installation marks.

(b)Two-union repair

1 You must use a two-union repair when the length of the defect is more than the specified limits (L max).
You remove (cut out) the part of the tube that has the defect.
There is a minimum length of tube (M min) that you must remove.
You replace the removed part of tube with :
- an equal or smaller (but nearly the same) length of equivalent tube
- two **RYNGLOK** unions.

(c)Swage near a bend
There must be a minimum length (N min) of straight tube to swage near a bend.

(5)Preparation (Ref. Fig. 065)

(a)Cut the tube. We recommend a chipless roller-type cutter.

(b)Make sure that the tube ends have no burrs (inner and outer sides). Deburr if necessary. Use an applicable deburring tool to prevent damage or contamination of the fluid system.

(c)Preparation of the painted tube ends

It is necessary to remove paint from a minimum length (Dim B) at the ends of the painted tube.

1 Remove paint with grade 400 emery cloth along the dim. B. Make sure that you do not cause scratches on the tube when you remove the paint.

(d)Make sure that all the tube ends are in the correct condition and agree with the tube dimension specifications

(e)Clean all the tube ends with a lint-free cotton cloth and CLEANING AGENTS (Material No. 11-003).

NOTE : Make sure that the cleaning agent does not go in the tube.

(f)Make the marks on the tubes.

1 Get the correct size marking gage (Ref. Fig. 062).
Put the applicable marking gage on each tube end.
With a permanent-ink felt-tipped pen, make the position and the inspection marks through the gage windows.

(6)Union installation (Ref. Fig. 066)

(a)Put the union in position:

1 Move the union on the tube ends and put the edge of the unswaged ring on the position mark.
The edge of the ring must be between the two ends of the position mark.
The length of the position mark gives the permitted tolerance for the position of the ring.

(b)Union assembly

1 Get the correct size tool (Ref. Fig. 062).

NOTE : The color code of the coupling ring must agree with the color of the movable jaw on the swaging tool.

2 Connect the flexible hose between the pump and the swaging tool.

3 Align the assembly tool to one leg of the union, with the ring in the movable jaw of the tool and the front opening of the tool against the union body.

NOTE : When you use the reversed tool, the union body is in the tool jaw and the front opening is against the ring.

NOTE : When you use size -20 and -24 swage tools, make sure that the swage bridge (connected to the tool by a lanyard) is in the correct position:
- the arrow on the swage bridge must point to the front of the tool,
- the swage tool detents must hold the swage bridge when the union is engaged in the tool (the swage tool detents make a click when the swage bridge becomes flush on the top of the tool).

NOTE : For the standard swage tool, you must engage the swage bridge in the tool body.
For the reversed tool, you must engage the swage bridge in the movable jaws.

4 Apply 8000 psi (551.5805 bar) 8500 psi (586.0543 bar) hydraulic pressure to the tool to move the union ring forward to complete the assembly.

NOTE : Tool pressure is 8000 psi (551.5805 bar) 8500 psi (586.0543 bar) for all union sizes or pressure classes.

NOTE : If you use the hand pump (P/N 10-00400A), you must monitor the pressure gage to get the correct pressure.
If you use the foot-operated air/hydraulic intensifier (P/N 10-00402), the intensifier will stop automatically when you have the correct swage pressure.

5 Depressurize the assembly tool and remove it from the union.

(c)Inspection of the assembled union

1 Ring position inspection
Get the correct size inspection gage (Ref. Fig. 062).
With the applicable inspection gage, do a check for correct position of the ring.
Make sure that you can install the inspection gage on the ring (flush).

2 Inspection mark
Make sure that the edge of the union touches or is on the inspection mark:
- this shows that the correct length of tube is engaged in the union.

NOTE : The installation tolerance is divided between the two ends of the union.
If the maximum length of tube is engaged in one end of the union, the minimum length must be engaged in the other end.
This is because unions can move freely on the tube (no positive tube stop).
If the maximum length of tube is engaged, you cannot see the related inspection mark until after the swage.

(7)Put the aircraft back to its initial configuration.

(a)Pressurize the related hydraulic reservoirs (Ref. 29-14-00, P. Block 301).

(b)If necessary, fill the related hydraulic reservoirs (Ref. 12-12-29, P. Block 1).

(c)Pressurize the related hydraulic systems (Ref. 29-10-00, P. Block 301).

(d)Make sure that there is no leakage in the repaired area.

(e)Bleed the related hydraulic system (Ref. 29-00-00, P. Block 401) (Ref. 32-42-00, P. Block 301) (Ref. 32-43-00, P. Block 301).

(f)If applicable, restore the protection on the repaired tube.

1 For aluminum tubes:
- Apply Material No. 13-002 on the bare metal of the tube with a brush.
- Finish the protection with Material No. 16-001C.

2 For CRES tube (if painted):
- Rub the bare metal with scotch-brite pad.
- Apply Material No. 16-020 on the bare metal of the tube.
- Finish the protection with Material No. 16-001C.

(8)Make sure that the work area is clean and clear of tool(s) and other items.

I. Temporary Repair of Hydraulic Tubes by Welding

(1)Equipment and materials

ITEM	DESIGNATION
(a)	Clean Stainless Steel Wire Brush
(b)	Grade 400 Emery Cloth

ITEM	DESIGNATION
(c)	Sandpaper-Grade 200
(d)	2-Cut Milling Cutter
(e)Material No. 11-026	Cleaning Agents (Ref. 20-31-00)

(2)Procedure requirements

(a)You must not do this repair on the aircraft. You must remove the pipe from the aircraft.

(b)Life limitation of the weld repair

1 A temporary repair with this manual T.I.G. welding method is limited to a maximum of 20 Flight Cycles.

NOTE : You must replace the repaired tube by a new one before a maximum of 20 Flight Cycles.

(c)Certification of the operators

1 The operators must have an approved licence/certificate (refer to the local Airworthiness Authorities) for:
- manual T.I.G. welding process,
- dye penetrant test.

(d)Repair criteria

1 You can do this repair procedure only if:
- the damage is a through crack with a maximum length of 10 mm (0.394 in.).
- the distance between two cracks is not less than 15 mm (0.591 in.).
- the weld does not change the geometry of the pipe.
- there is not already a repair in the repair area.
- two longitudinal cracks are not on the same generatrix (line).
- the tube does not have more than 5% ovalization for stainless steel pipes.

2 Only one weld is permitted on the circumference.

(e)Adjustment of the welding parameters

1 Before the repair, you must do a welding test on a specimen of tube of the same material and with the same diameter/thickness to get the applicable welding parameters (electrode diameter, amperage, power, etc).

NOTE : You must do the steps described in this procedure during the welding test.

NOTE : You must identify the test specimens and keep them until the replacement of the repaired pipe.

(f)Weldable materials

1 This repair method is applicable only for the tube material that follows :

Stainless steel 21.6.9 (ASNA3288) material						
Tube Size	Tube DIA.		Thickness		Operating Pressure	
	in.	mm	in.	mm	psi	bar
-04	1/4	6.35	0.016	0.406	3000	206

Stainless steel 21.6.9 (ASNA3288) material						
-06	3/8	9.525	0.019	0.508	3000	206
-08	1/2	12.70	0.026	0.66	3000	206
-10	5/8	15.875	0.032	0.838	3000	206
-12	3/4	19.050	0.051	0.991	3000	206
-16	1	25.4	0.052	1.321	3000	206
-24	1-1/2	38.1	0.024	0.609	80	5.5

2 This repair method is not applicable for light alloy 6061T6 tube material.

(3)Procedure

(a)Welding procedure (Ref. Fig. 067)

NOTE : You must remove the pipe from the aircraft to do this procedure.

1 Clean the pipe

- If the tube is painted (for stainless tubes):
  Remove the paint with grade 400 emery cloth from the full circumference of the tube along a sufficient length around the damage area.
- Clean the outside of the tube with Cleaning Agents (Material No. 11-026).
- Flush the inside of the tube with Cleaning Agents (Material No. 11-026). Do the operation three or four times to remove all grease from the tube.
- Flush the tube with water.
- Let the tube dry in ambient air.

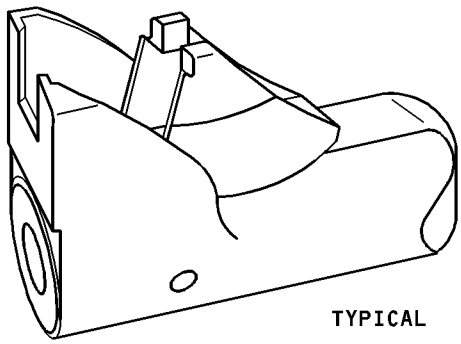
2 Identify the location of the damage

- Blow dry compressed air, at a pressure of approximately 10 bar (145.038 psi), through the tube.
- Soak the outer surface of the tube in water or apply a leak detection product to see the leak.
- Grind the surface of the tube along the full length of the crack to identify the damage area.
- Accurately identify each end of the crack. The identification mark must not be more than 2 mm (0.079 in.) on each side of the length of the crack.

3 Prepare the damage area for the repair

- With a 2-cut milling cutter, make a groove along the length of the defect plus 5 mm (0.197 in.) on either side of the crack.
  NOTE : Use a 2-cut milling cutter with the characteristics:
  - 40 teeth,
  - cut angle: 110 Deg.,
  - DIA.: 15 mm (0.591 in.),

SWAGING TOOLS



TYPICAL

SWAGING TOOLS P/N

TUBE SIZE	TUBE DIA.		SWAGING TOOL P/N		
	in.	mm	STANDARD TOOL	REVERSED TOOL	PUSH/PULL TOOL
-04	1/4	6.35	RTST8-01-04	RTST8R-01-04	RTST8-02-04
-06	3/8	9.525	RTST8-01-06	RTST8R-01-06	RTST8-02-06
-08	1/2	12.7	RTST8-01-08	RTST8R-01-08	RTST8-02-08
-10	5/8	15.875	RTST8-01-10	RTST8R-01-10	RTST8-02-10
-12	3/4	19.050	RTST8-01-12	RTST8R-01-12	RTST8-02-12
-16	1	25.4	RTST5-01-16	RTST5R-01-16	RTST5-02-16
-20	1-1/4	31.750	RTST4-01-20	RTST4R-01-20	RTST4-02-20
-24	1-1/2	38.10	RTST2-01-24	RTST2R-01-24	RTST2-02-24

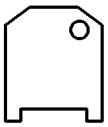
* PRESSURE CLASS AND COLOR CODE IN THE P/N RTST (X)..., THE "X" NUMBER DENOTES THE PRESSURE CLASS OF THE UNION

PRESSURE CLASS NUMBER	MAXIMUM UNION OPERATING PRESSURE	COLOR OF TOOL JAW AND UNION RING
8	8000 PSI	SILVER (NO COLOR CODE)
5	5000 PSI	BLUE
4	4000 PSI	BLACK
2	2500 PSI	GREEN

BM5 20 23 11 0 LAMA 00

RYNGLOK Installation Tooling
(Sheet 1/2)
Figure 062

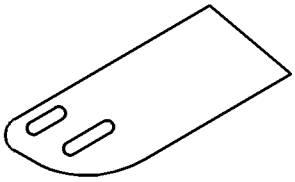
INSPECTION GAGES



TYPICAL

TUBE SIZE	TUBE DIA.		INSPECTION GAGE P/N
	in.	mm	
-04	1/4	6.35	RTSGO-51-04
-06	3/8	9.525	RTSGO-51-06
-08	1/2	12.7	RTSGO-51-08
-10	5/8	15.875	RTSGO-51-10
-12	3/4	19.050	RTSGO-51-12
-16	1	25.4	RTSGO-51-16
-20	1-1/4	31.750	RTSGO-51-20
-24	1-1/2	38.10	RTSGO-51-24

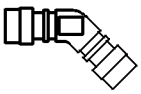
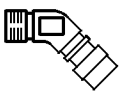
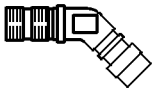
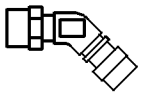
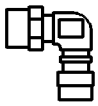
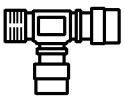
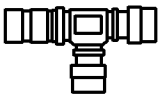
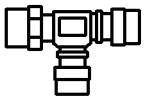
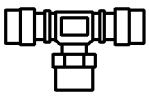
MARKING GAGES



TYPICAL

TUBE SIZE	TUBE DIA.		MARKING GAGE P/N
	in.	mm	
-04	1/4	6.35	RTSGO-01-04
-06	3/8	9.525	RTSGO-01-06
-08	1/2	12.7	RTSGO-01-08
-10	5/8	15.875	RTSGO-01-10
-12	3/4	19.050	RTSGO-01-12
-16	1	25.4	RTSGO-01-16
-20	1-1/4	31.750	RTSGO-01-20
-24	1-1/2	38.10	RTSGO-01-24

RYNGLOK Installation Tooling
(Sheet 2/2)
Figure 062

	PERMANENT TO PERMANENT	PERMANENT TO "MS" FLARELESS		
		MALE FITTING MS33514	MALE BULKHEAD FITTING MS33515	FERMALE FITTING NAS1760
UNION				
NON-REDUCER	R80101T()	R82121T()	R82141T()	R82101T()
REDUCER	R80151T()()	R82171T()()	R82191T()()	R82151T()()
45° ELBOW				
NON-REDUCER	R80102T()	R82122T()	R82142T()	R82102T()
REDUCER	R80152T()()	R82172T()()	R82192T()()	R82152T()()
90° ELBOW				
NON-REDUCER	R80103T()	R82123T()	R82143T()	R82103T()
REDUCER	R80153T()()	R82173T()()	R82193T()()	R82153T()()
TEE				
(SEPARABLE ON RUN)				
NON-REDUCER	R80104T()	R82124T()	R82144T()	R82104T()
REDUCER	R80154T()()()	R82174T()()()	R82194T()()()	R82154T()()()
TEE				
(SEPARABLE ON SIDE)				
NON-REDUCER	N/A	R82126T()	R82146T()	R82106T()
REDUCER	N/A	R82176T()()()	R82196T()()()	R82156T()()()

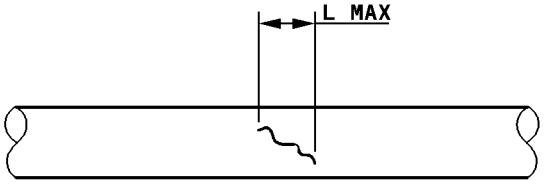
TUBE SIZE ()	TUBE DIA in.	TUBE DIA mm
04	1/4	6.35
06	3/8	9.53
08	1/2	12.70
12	3/4	19.05
16	1	25.40
20	1-1/4	31.75
24	1-1/2	38.10

Union Assemblies
Figure 063

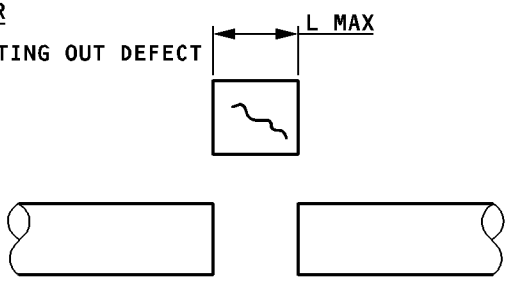
BM5 20 23 11 0 LBM0 01

SINGLE UNION REPAIR

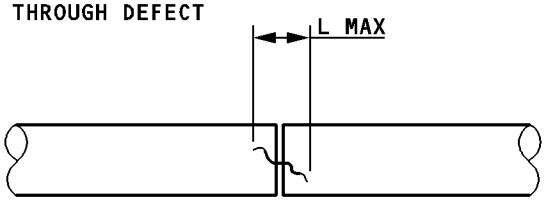
DEFECT LENGTH



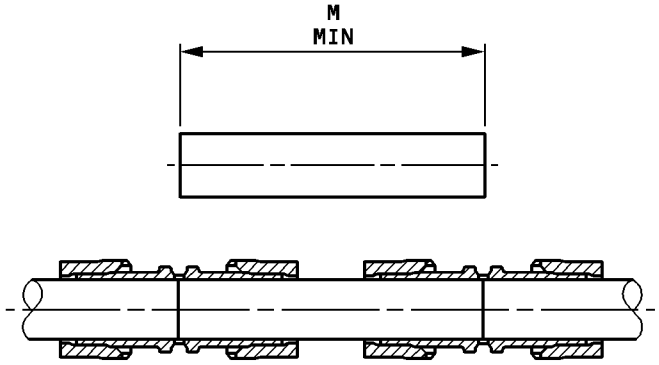
CUTTING OUT DEFECT



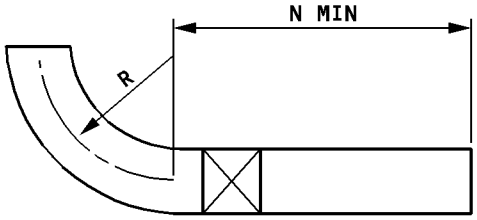
CUTTING THROUGH DEFECT



TWO UNION REPAIR
TUBE SECTION REMOVAL



MINIMUN STRAIGHT TUBE FOR
SWAGING NEAR A BEND

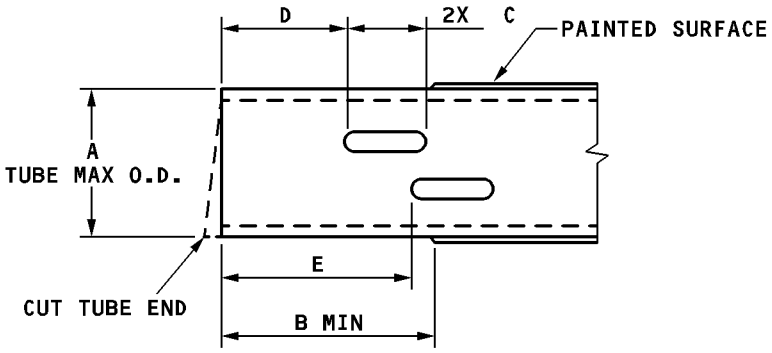


TUBE SIZE	TUBE DIA.		L MAX.		M MIN.		N MIN.	
	in.	mm	in.	mm	in.	mm	in.	mm
-04	1/4	6.35	0.300	7.62	2.38	60.45	1.00	25.40
-06	3/8	9.525	0.300	7.62	2.64	67.05	1.25	31.75
-08	1/2	12.7	0.350	8.9	2.92	74.16	1.45	36.83
-10	5/8	15.875	0.350	8.9	3.18	80.77	1.72	43.68
-12	3/4	19.050	0.350	8.9	3.56	90.42	1.98	50.29
-16	1	25.4	0.400	10.15	4.15	105.40	2.50	63.50
-20	1-1/4	31.750	0.400	10.15	4.81	122.17	3.00	76.20
-24	1-1/2	38.10	0.400	10.15	5.42	137.66	3.50	88.90

BM5 20 23 11 0 LCM0 00

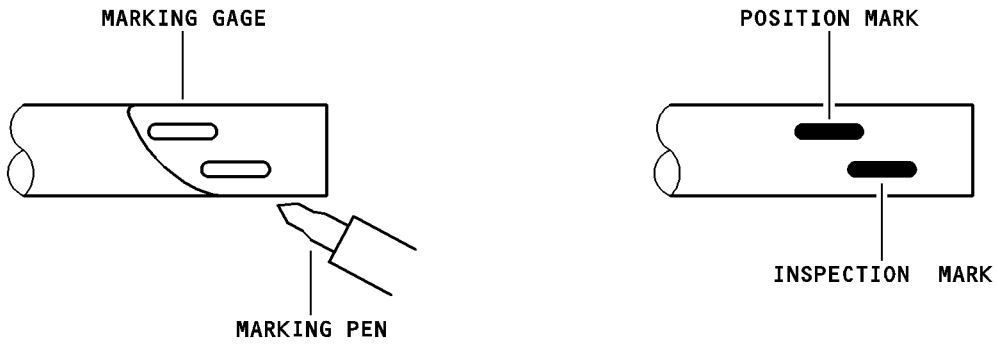
Tubing Repair
Figure 064

TUBE END DIMENSION



TUBE SIZE	TUBE DIA.		A MAX.		B MIN.		C±0.005in.(0.12mm)		D±0.005in.(0.12mm)		E±0.005in.(0.12mm)	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
-04	1/4	6.35	0.254	6.451	0.525	13.334	0.300	7.62	0.525	13.334	0.717	18.211
-06	3/8	9.525	0.379	9.626	0.656	16.662	0.300	7.62	0.656	16.662	0.843	21.412
-08	1/2	12.7	0.505	12.826	0.773	19.634	0.350	8.89	0.773	19.634	0.963	24.460
-10	5/8	15.875	0.630	16.001	0.899	22.834	0.350	8.89	0.899	22.834	1.088	27.635
-12	3/4	19.050	0.755	19.176	1.042	26.466	0.350	8.89	1.042	26.466	1.232	31.292
-16	1	25.4	1.006	25.552	1.299	32.994	0.400	10.16	1.299	32.994	1.498	38.049
-20	1-1/4	31.750	1.256	31.902	1.572	39.928	0.400	10.16	1.572	39.928	1.781	45.237
-24	1-1/2	38.10	1.507	38.277	1.862	47.294	0.400	10.16	1.862	47.294	2.086	52.984

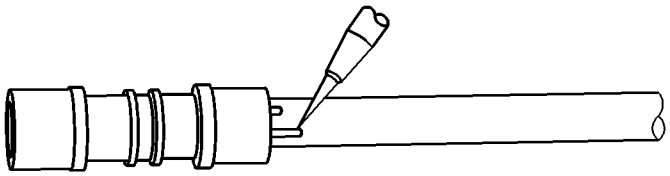
TUBE END MARKING



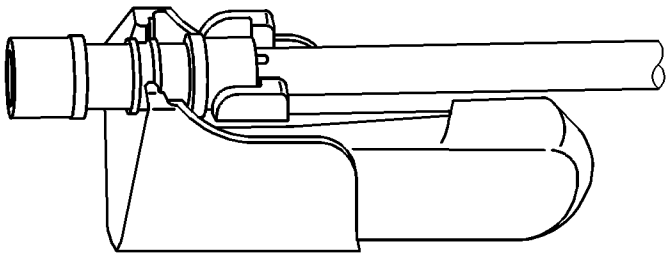
BM5 20 23 11 0 LDM0 00

Tube End Dimension and Marking
Figure 065

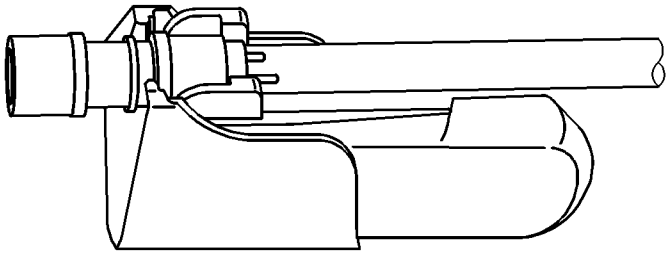
1. POSITION THE UNION



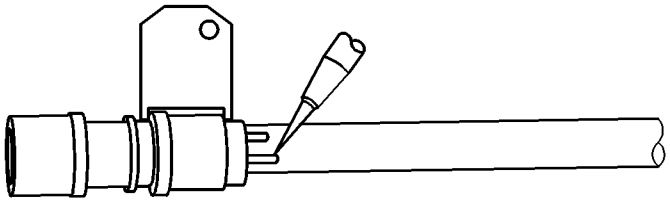
2. POSITION THE TOOL



3. ADVANCE THE RING



4. INSPECT THE INSTALLATION



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Union Installation
Figure 066

- width: 1.8 mm (0.071 in.) or 2 mm (0.079 in.) or 2.2 mm (0.087 in.).

- The shape of the tool gives the width of the groove.
- The cutter must almost go through the tube wall (95% of the thickness).

NOTE : If the cutter goes through the wall, the opening (at the inner surface) must not be more than 0.2 mm (0.008 in.) over a length of a few millimeters.

4 Clean the prepared area

- For stainless steel tubes:

Clean the area with a clean stainless steel wire brush.

NOTE : Make sure that you use a clean stainless steel wire brush.

NOTE : Make sure that you do not cause damage to the pipe around the prepared area.

Remove dust with Cleaning Agents (Material No. 11-026).

NOTE : Do not use a compressed air gun to remove dust.

5 Weld the tube (T.I.G. welding process)

- Do the gaseous protection

NOTE : The welding torch gives protection to the outside of the tube.

Blow a neutral gas inside the tube with a flow rate of 4 to 10 l/min. for a sufficiently long time (about 10 min. for a long pipe). Decrease the flow rate to 4 l/min. during the welding operation.

- Weld the tube.

NOTE : Make sure that the welding equipment parameters are the same as those used on the test specimen.

. For stainless steel 21-9-6 tubes, use Z2 CND 20-10-3 filler metal.

- Stop the gaseous protection
  . Outside the tube, continue the argon flow for at least one minute after welding.
  . Inside the tube, continue to blow the inert gas through the tube for one minute after welding.

6 Inspection of the repaired area

a Do a visual inspection of the weld bead:

- Make sure that the width of the weld bead is:
  . 3 mm (0.118 in.) for a tube thickness of less than 0.48 mm (0.019 in.)
  . between 3 mm (0.118 in.) and 5 mm (0.197 in.) for a tube thickness of between 0.48 mm (0.019 in.) and 1.3 mm (0.051 in.).
- Make sure that the maximum height of the weld bead is not more than 0.1 mm (0.004 in.).

  If the maximum weld bead height is more than 0.1 mm (0.004 in.):
  . grind and finish with sandpaper-grade 200. Make sure that the remaining thickness is more than the thickness measured on the base metal.
- Make sure that the crater at the beginning and the end of the weld bead is free of subsiding, cracking and staining.

  NOTE : Light staining is permitted. On a small diameter tube,

staining on the opposite side of the weld must remain within the limits of the thermally affected zone.

b Pressure test

Do a pressure test for 3 minutes minimum at ambient temperature with hydraulic fluid at:

. 360 bar (5221.357 psi) for tube in stainless steel 21-9-6 high pressure pipes
. 120 bar (1740.452 psi) for tube in stainless steel 21-9-6 low pressure pipes
. 15 bar (217.556 psi) for tube in stainless steel 21-9-6 suction pipes.

NOTE : No leak is permitted.

c Dye penetrant test

- Do a dye penetrant test in the welded area.
- Make sure that there is no sign of a defect.
  NOTE : If you are not sure of the quality of the weld, rub with sandpaper-grade 200 and do the dye penetrant test again.
- If the dye penetrant test shows that there is a defect:
  . either discard the repaired pipe and install a new one on the aircraft
  . or remove the repaired part of the pipe. Cut the pipe at a minimum of 1.5 in. (38.099 mm) from each end of the weld bead and do an approved repair given in this topic.

R 6. Not Applicable

7. Permitted Damage and Defects on Flexible Hydraulic Hoses

A. Equipment and Materials

REFERENCE	DESIGNATION
Material No. 11-026	GB DEF-STAN 68-148/1 SOLVENT GENERAL PURPOSE (Ref. 20-31-00)
Material No. 19-003	USA AMS 3819 LINT-FREE COTTON CLOTH (Ref. 20-31-00)

B. Procedure

(1)Permitted Damage and Defects on Flexible Hydraulic Hoses

NOTE: This topic is not applicable to the flexible engine hoses. Refer to the engine manufacturer for repairs of the engine hoses.

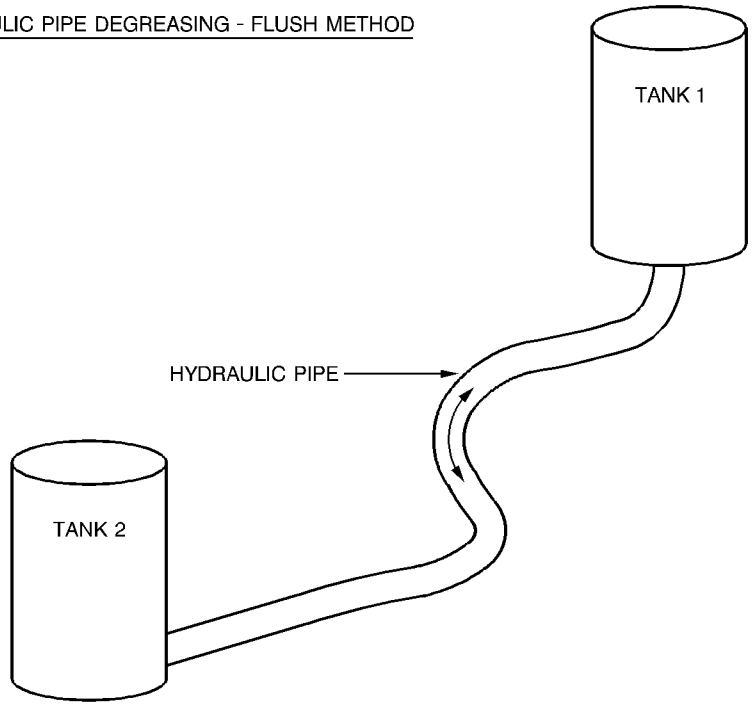
(a)Permitted damage and defects

NOTE : When the damage or defects on the flexible hoses are more than the permitted limits given below, you must replace the flexible hoses.

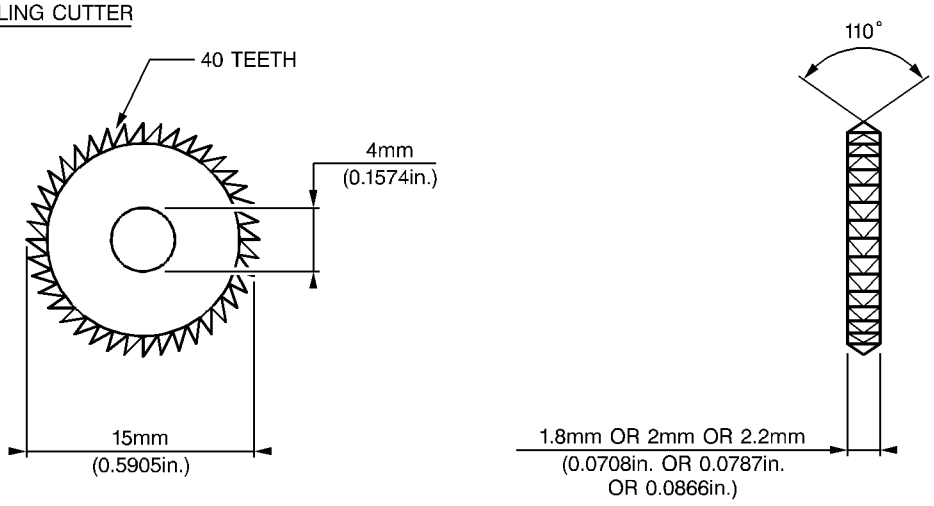
1 Permitted limits for traces of impact and surface defects

NOTE: Surface defects are discontinuities such as:

1-HYDRAULIC PIPE DEGREASING - FLUSH METHOD



2-CUT MILLING CUTTER



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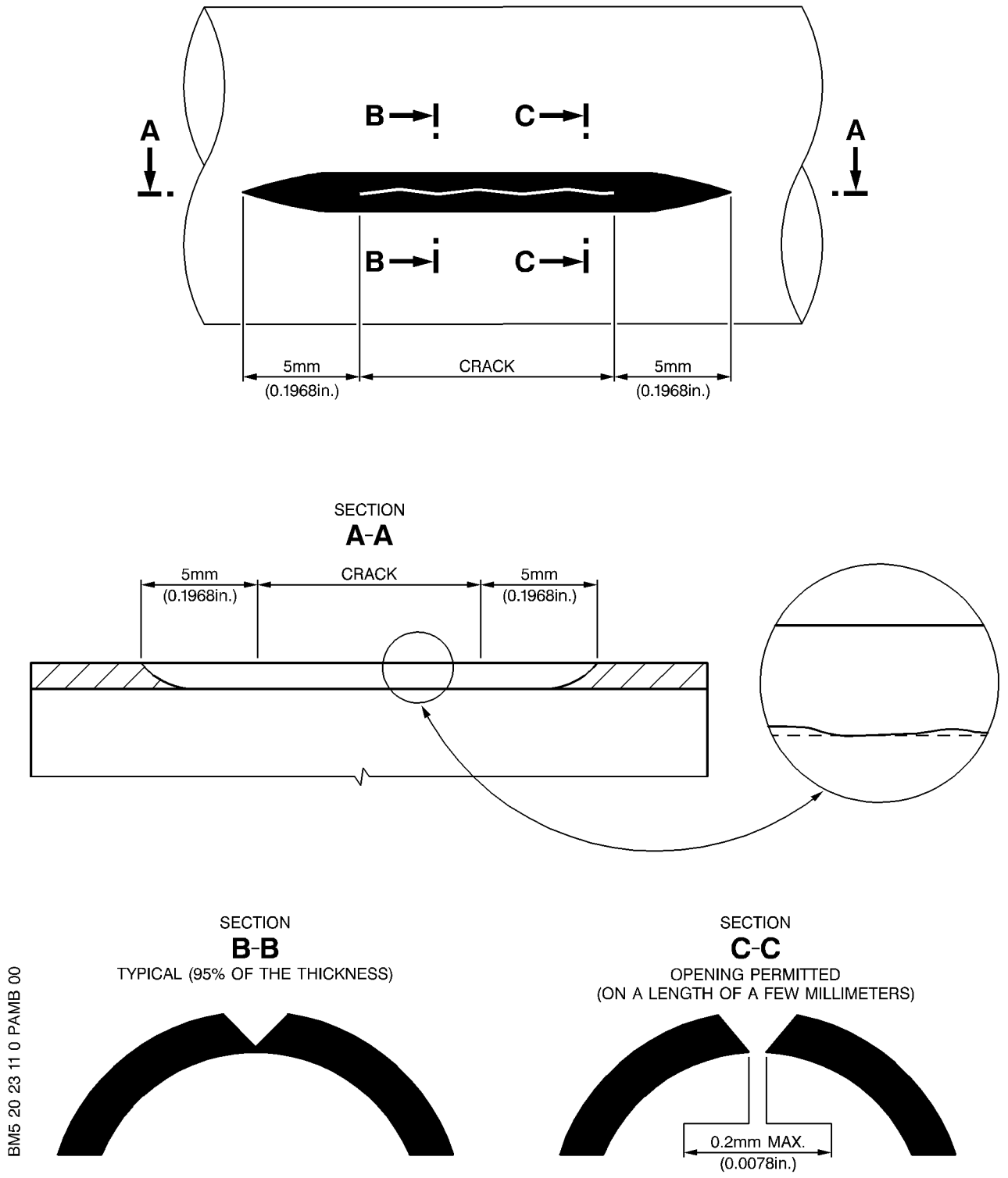
Preparation of the Damage Area
(Sheet 1/2)
Figure 067



Preparation of the Damage Area
(Sheet 2/2)
Figure 067

- nicks
- scratches
- cracks and forging laps
- scores
- corrosion pits.

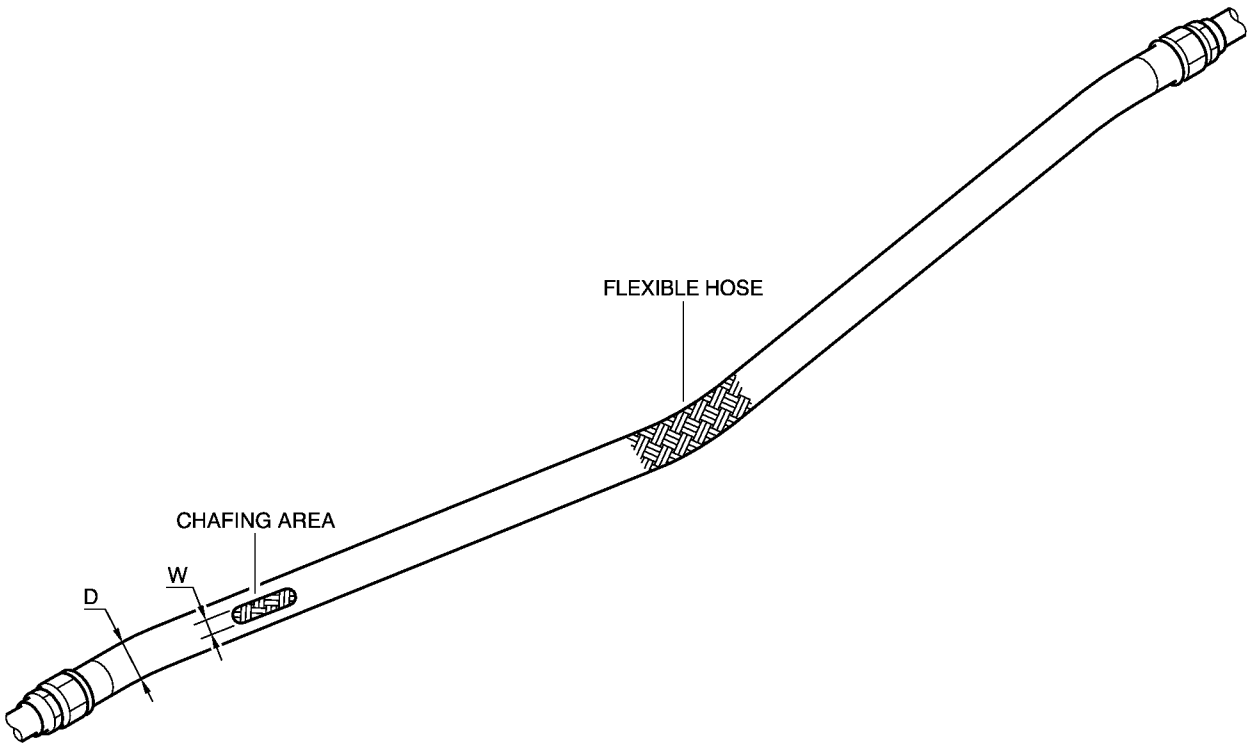
a Use **CLEANING AGENTS** (Material No. 11-026) and **MISCELLANEOUS** (Material No. 19-003) to clean the flexible hose.

b Visually examine the hose, conduits and fittings to identify chafing marks on the hose surface, cuts or kinks or other types of damage.

- Replace the flexible hose if:
  . there is a surface defect with signs of dents, kinks or deformation,
  . two or more wires in one plait or several wires are broken in one small area,
  . the braid has a neoprene lay protection and there are signs of wear or chafing on the braid.

- If there are signs of wear after chafing:
(Ref. Fig. 068)
  . Measure the width of the wear (W) and its external diameter (D).
    If W x 100 / D x 3.14 > 10%, replace the flexible hose.

    NOTE: You must measure the hose diameter (D) on a straight area immediately after the socket.



BM5 20 23 11 0 BAM0 00

Permitted Damage and Defects on Flexibles Hoses
Figure 068

SPECIFIED TORQUE VALUES FOR UNIONS

1. General

Specified torque values for **AN, HARRISON, PERMASWAGE** as well as quick-disconnect seal couplings and installation instructions for **JANITROL** clamps are covered in this topic. When torquing union nuts, firmly hold union body by means of a wrench, so as to prevent sleeve from rotating, and thus avoid scoring of the flared pipe end and twisting of the line.
When torquing tee-unions or elbow-unions, observe the same precautions, in order to prevent union nut from scoring line surface.
Where space is not available for the use of a torque wrench, tightening shall be done by means of a standard wrench. Care shall be taken, in such case, not to overtorque the union nut.

2. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedures	
- 20-23-11, P. Block 1	Installation and Repair of Tubing

3. Procedure

R A. Tightening Torques for Hydraulic Systems

NOTE : Before you torque a component, obey the precautions and procedures given in the tightening practices for hydraulic connections procedure (Ref. 20-23-11, P. Block 1).

(1)Tightening torques for flexible hoses.

(a)Steel union mounted on steel equipment or tube.
(Ref. Fig. 001)

(b)Aluminum-alloy union mounted on aluminum-alloy equipment or tube.
(Ref. Fig. 002)

(c)Union with one of the constituents (union or equipment or tube) made of aluminum-alloy.
(Ref. Fig. 002)

(2)Tightening torques for blanking caps/plugs.

(a)Steel cap/plug mounted on a steel component.
(Ref. Fig. 003)

(b)Aluminum-alloy cap/plug mounted on an aluminum-alloy component.
(Ref. Fig. 004)

(c)Cap/plug with one of the constituents (cap/plug or component) made of aluminum-alloy.
(Ref. Fig. 004)

(3)Tightening torques for plug-in unions.

NOTE : The material of the lock-nut must be identical to the material of the swivel plug-in union or the bulkhead connection.

(a)Plug-in steel unions
Steel unions mounted on a steel component. Lock nut for swivel plug-in union. Lock nut for bulkhead connection.
(Ref. Fig. 003)

(b)Plug-in aluminum-alloy unions
Aluminum-alloy union mounted on an aluminum component. Lock nut for swivel plug-in union. Lock nut for bulkhead connection.
(Ref. Fig. 004)

(c)Plug-in unions with one of the constituents (union or component) made of aluminum-alloy.
(Ref. Fig. 004)

(4)Tightening torques for **HARRISON** and **PERMASWAGE** unions.

(a)Removable steel swaged unions, of the **HARRISON** and **PERMASWAGE** type and removable **MS**-type unions (**CRES** and titanium tubes).
(Ref. Fig. 005)

(b)Removable aluminum-alloy swaged unions of the **HARRISON** and **PERMASWAGE** type and removable **MS**-type unions (aluminum-alloy tubes).
(Ref. Fig. 006)

(c)**HARRISON** and **PERMASWAGE** type removable unions with one of the constituents (union or tube) made of aluminum-alloy.
(Ref. Fig. 006)

(5)Tightening torques for plug-in check valves.

(a)Steel check valves mounted on steel component.
(Ref. Fig. 003)

(b)Check valves with one of the constituents (check valve or component) made of aluminum-alloy.
(Ref. Fig. 004)

(6)Tightening torques for in-line check valves.

(a)Steel check valves mounted on steel or titanium pipes.
(Ref. Fig. 005)

(b)Check valves with one of the constituents (union or pipe) made of aluminum-alloy.
(Ref. Fig. 006)

R (7)Tightening torques for **AN** unions.
(Ref. Fig. 007)

(a)**AN** unions have a male fitting-end and are fitted on flared tubes. This union type maintains the contact between the unions and the tube, which remains on the outer side of the unions.
(Ref. Fig. 008)

R B. Tightening Torques for De-icing Systems

R (1)Tightening torques for removable **HARRISON** and **PERMASWAGE** swaged unions
R and removable **MS**-type unions used on **CRES** or titanium tubes.
R (Ref. Fig. 009)

R (2)Hydraulic type installation with **HARRISON** unions.
R Aluminum-alloy tube and union.
R (Ref. Fig. 006)

R C. Tightening Torques for Rain protection Systems

R (1)Hydraulic type installation with **HARRISON** unions.
R Titanium tube and union.
R (Ref. Fig. 009)

R (2)Hydraulic type installation with **HARRISON** unions.
R Aluminum-alloy tube and union.
R (Ref. Fig. 006)

R D. Tightening Torques for Fire Extinguishing Systems
R (1)Tightening torques for hydraulic type aluminum-alloy unions used on
R aluminum-alloy tubes.
R (Ref. Fig. 006)

R E. Tightening Torques for Pressurization Systems
R (1)Tightening torques for hydraulic type CRES unions used on CRES tubes.
R (Ref. Fig. 009)
R (2)Tightening torques for hydraulic type aluminum-alloy unions used on
R aluminum-alloy tubes.
R (Ref. Fig. 006)

R F. Tightening Torques for Water Systems
R (1)Tightening torques for hydraulic type CRES unions used on CRES tubes.
R (Ref. Fig. 009)

R G. Tightening Torques for Air Data Systems
R (1)Hydraulic type installation with HARRISON unions.
R Titanium tubes and unions.
R (Ref. Fig. 009)
R (2)Hydraulic type installation with HARRISON unions.
R Aluminum-alloy tubes and unions.
R (Ref. Fig. 006)

4. Installation of JANITROL Clamps (Ref. Fig. 010)

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Torque wrench
(2)	Wooden mallet
(3)Material No. 16-001	Structure paints (Ref. 20-31-00)

B. Procedure
(1)Job set-up
(a)Make certain that ducts of lines are correctly aligned and not under tension.
(b)Carefully clean both of the welded connecting flanges and make certain that there is no foreign body on contact interfaces and on conical surfaces of flanges.
(c)Make certain that tapered contact faces of clamp segments are perfectly clean.
(2)Double safety clamps (lock plus safety catch).
(a)Offer up clamp on both flanges.
(b)Close clamp and gradually apply TORQUE by means of torque wrench set to minimum torque value indicated on outer face of clamp.
(c)Upon assembly, bed down flanges by gently tapping outside of clamp with a mallet.
NOTE : If safety catch engages before minimum torque has been reached,

ITEM CODE	OUTER DIA		TIGHTENING TORQUES			
			STEEL			
			min		maxi	
	In	mm	m daN	lbf in.	m daN	lbf in.
3	3/16	4,76	1,07	95	1,18	105
4	1/4	6,35	1,52	135	1,63	145
5	5/16	7,93	1,92	170	2,15	190
6	3/8	9,52	2,43	215	2,76	245
8	1/2	12,70	4,86	430	5,31	470
10	5/8	15,87	7,00	620	7,68	680
12	3/4	19,05	9,66	855	10,68	945
16	1”	25,40	12,90	1140	14,20	1260
20	1”1/4	31,75	17,20	1520	19,00	1680
24	1”1/2	38,10	21,50	1900	23,70	2100

BM5 20 23 12 0 ACM0 00

Tightening Torques for Flexible Hoses
(Both Constituents Made of Steel)
Figure 001

ITEM CODE	OUTER DIA		TIGHTENING TORQUES			
			ALUMINUM ALLOY			
			min		maxi	
	In	mm	m daN	lbf in.	m daN	lbf in.
3	3/16	4,76	0,28	25	0,40	35
4	1/4	6,35	0,56	50	0,73	65
5	5/16	7,93	0,79	70	1,02	90
6	3/8	9,52	1,24	110	1,47	130
8	1/2	12,70	2,60	230	2,94	260
10	5/8	15,87	3,73	330	4,07	360
12	3/4	19,05	5,20	460	5,65	500
16	1"	25,40	7,23	640	7,91	700
20	1"1/4	31,75	9,04	800	10,17	900
24	1"1/2	38,10	9,04	800	10,17	900

BM5 20 23 12 0 AEM0 00

Tightening Torques for Flexible Hoses
(One of the Constituents Made of Aluminum Alloy)
Figure 002

ITEM CODE	OUTER DIA		TIGHTENING TORQUES			
			STEEL			
			min		maxi	
	In	mm	m daN	lbf in.	m daN	lbf in.
3	3/16	4,76	2,2	195	2,31	204
4	1/4	6,35	3,34	296	3,44	304
5	5/16	7,93	3,34	296	3,44	304
6	3/8	9,52	4,47	396	4,57	404
8	1/2	12,70	7,85	695	7,95	704
10	5/8	15,87	11,24	995	11,35	1005
12	3/4	19,05	14,00	1239	14,24	1260
16	1”	25,40	18,53	1640	18,75	1660
20	1”1/4	31,75	20,22	1790	20,45	1810
24	1”1/2	38,10	20,80	1841	21,00	1859

BM5 20 23 12 0 AGM0 00

Plug-in Union and Check Valve, Swivel Plug-in Union and
Bulkhead Connection Lock Nut and Cap/Plug
Figure 003

ITEM CODE	OUTER DIA		TIGHTENING TORQUES			
			ALUMINUM ALLOY			
			min		maxi	
	In	mm	m daN	lbf in.	m daN	lbf in.
3	3/16	4,76	0,83	73	0,94	83
4	1/4	6,35	1,21	107	1,32	117
5	5/16	7,93	1,21	107	1,32	117
6	3/8	9,52	1,63	144	1,75	155
8	1/2	12,70	3,47	307	3,58	317
10	5/8	15,87	5,03	445	5,14	455
12	3/4	19,05	7,29	645	7,40	655
16	1"	25,40	11,64	1030	11,86	1050
20	1"1/4	31,75	13,44	1190	13,67	1210
24	1"1/2	38,10	14,10	1248	14,30	1266

BM5 20 23 12 0 AJM0 00

Plug-in Unions and Check Valve, Swivel Plug-in Union and Bulkhead Connection Lock Nut and Cap/Plug (Aluminum)
Figure 004

ITEM CODE	OUTER DIA		TIGHTENING TORQUES			
			CRES AND TITANIUM TUBES			
			min		max	
	In	mm	m daN	lbf in.	m daN	lbf in.
3	3/16	4,76	1,1	97	1,2	106
4	1/4	6,35	1,5	133	1,7	150
5	5/16	7,93	2,0	177	2,3	204
6	3/8	9,52	2,9	257	3,2	283
8	1/2	12,70	5,4	478	5,9	522
10	5/8	15,87	7,5	664	8,3	735
12	3/4	19,05	8,5	752	9,5	840
16	1”	25,40	8,5	752	9,5	840
20	1”1/4	31,75	8,5	752	9,5	840
24	1”1/2	38,10	8,5	752	9,5	840

BM5 20 23 12 0 ALM0 01

Tightening Torques for Hydraulic Type Unions and In-Line Check Valves (Both Constituents made of Steel or Steel and Titanium)
Figure 005

ITEM CODE	OUTER DIA		TIGHTENING TORQUES			
			ALUMINUM ALLOY			
			min		max	
	In	mm	m daN	lbf in.	m daN	lbf in.
3	3/16	4,76				
4	1/4	6,35	1,2	106	1,3	115
5	5/16	7,93	1,5	133	1,7	150
6	3/8	9,52	1,8	159	2,0	177
8	1/2	12,70	3,0	266	3,3	292
10	5/8	15,87	3,9	345	4,3	381
12	3/4	19,05	4,8	425	5,3	469
16	1"	25,40	8,1	717	8,9	788
20	1"1/4	31,75	9,7	859	10,7	947
24	1"1/2	38,10	9,7	859	10,7	947

BM5 20 23 12 0 ANM0 00

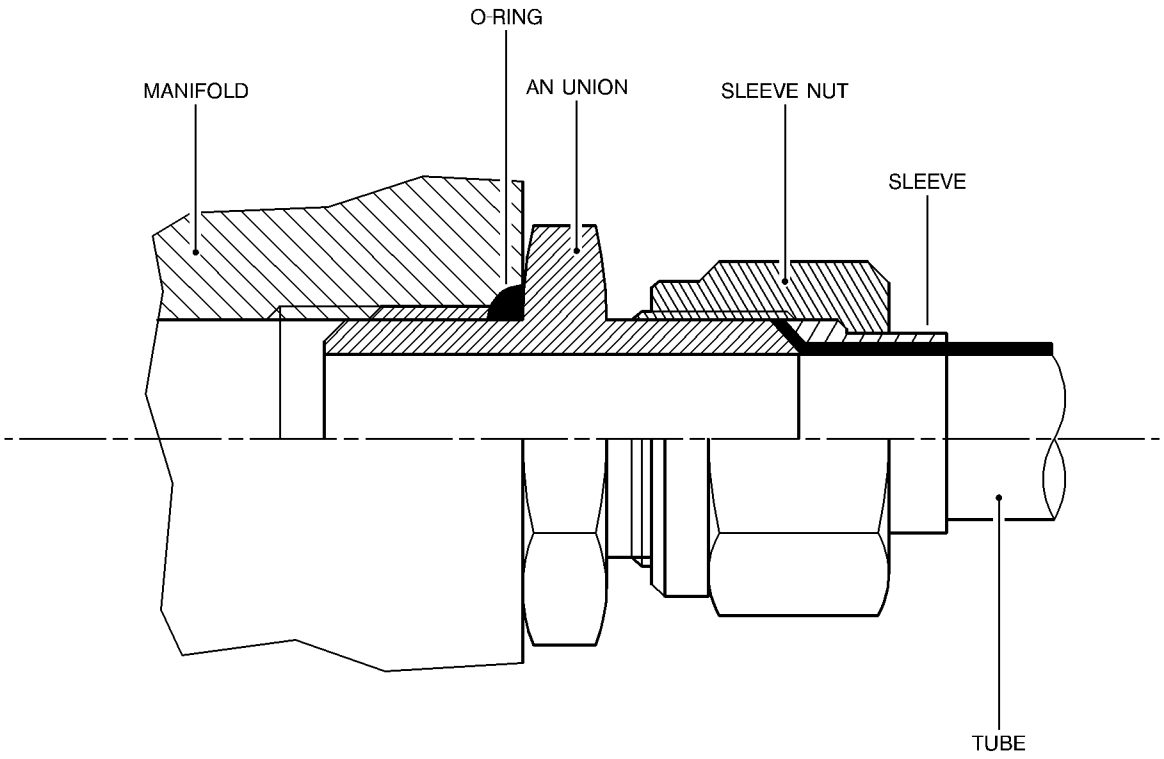
Tightening Torques for Hydraulic Type Unions and In-Line Check Valves (One of the Constituents Made of Aluminum Alloy)
Figure 006

ITEM CODE	OUTER DIA		TIGHTENING TORQUES											
			ALUMINUM ALLOY TUBES						CRES TUBES					
			min		mean		max		min		mean		max	
	In	mm	m daN	lbf in.	m daN	lbf in.	m daN	lbf in.	m daN	lbf in.	m daN	lbf in.	m daN	lbf in.
3	3/16	4,76	0,34	30	0,50	44	0,59	52	0,98	87	1,10	97	1,12	99
4	1/4	6,35	0,44	32	0,60	53	0,73	65	1,52	135	1,60	142	1,66	147
5	5/16	7,93	0,68	60	0,80	71	0,88	78	1,52	135	1,60	142	1,71	151
6	3/8	9,52	0,83	73	1,10	97	1,37	121	2,35	208	2,40	212	2,64	284
8	1/2	12,70	1,66	147	2,20	196	2,79	247	5,00	445	5,30	469	5,59	495
10	5/8	15,87	2,25	199	3,00	266	3,92	347	7,25	642	7,50	664	7,84	694
12	3/4	19,05	3,33	295	4,40	389	5,59	495	10,00	885	10,60	938	11,18	990
16	1”	25,40	5,59	495	6,60	584	7,84	694	13,43	1189	14,40	1275	15,69	1389
20	1”1/4	31,75	6,67	590	8,30	735	10,00	885	15,25	1350	16,40	1452	17,5	1549
24	1”1/2	38,10	6,67	590	8,30	735	10,00	885	15,80	1398	17,00	1504	18,10	1602

TIGHTENING TORQUES FOR AN UNIONS FOR TORQUES WRENCHES
WITHOUT EXTENSIONS.

BM5 20 23 12 0 APM0 00

Tightening Torques for AN Unions for Torque Wrenches
Without Extensions
Figure 007



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AN Union
Figure 008

ITEM CODE	OUTER DIA		TIGHTENING TORQUES			
			CRES AND TITANIUM TUBES			
			min		max	
	In	mm	m daN	lbf in.	m daN	lbf in.
3	3/16	4,76	1,1	97	1,2	106
4	1/4	6,35	1,5	133	1,7	150
5	5/16	7,93	2,0	177	2,3	204
6	3/8	9,52	2,9	257	3,2	283
8	1/2	12,70	5,4	478	5,9	522
10	5/8	15,87	7,5	664	8,3	735
12	3/4	19,05	9,7	71,53	10,7	78,90
16	1"	25,40	12,9	95,13	14,2	104,71
20	1"1/4	31,75	17,2	126,84	19,0	140,11
24	1"1/2	38,10	21,5	158,55	23,7	174,77

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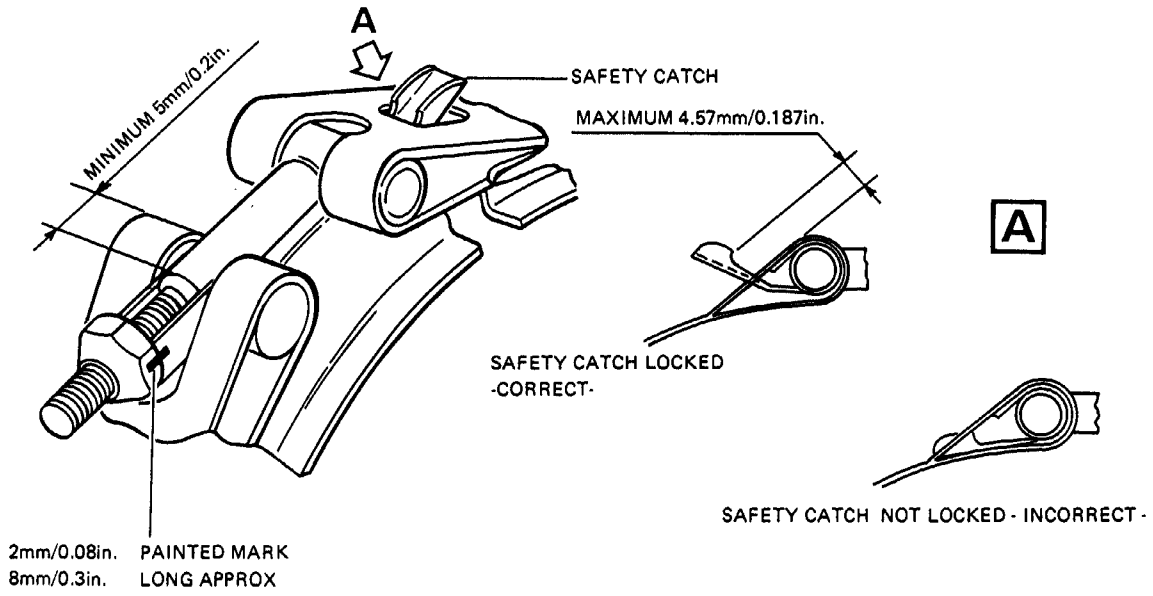
Tightening Torques for Unions and In-Line Check Valves
(Both Constituents made of Steel or Steel and Titanium)
Figure 009

R



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Installation of JANITROL Clamps
Figure 010

continue torquing to minimum indicated value.

(d)Make certain that play between catch and clamp strip does not exceed 4.75 mm (0.186 in.). Otherwise, clamp must be replaced.

NOTE : If safety catch does not engage, set torque wrench to maximum torque value indicated on clamp and continue to torque.
If safety catch does not engage then, check that it does not foul on any part of clamp.
Otherwise, a new attempt is allowed, with the torque wrench set to a torque value in excess of 15 lbf. in. (0.16 m.daN) with reference to the maximum indicated value.
If the safety catch does not engage during this last attempt, the clamp must be rejected.

(3)Single safety clamps (lock only)

(a)Offer up clamp on both flanges, close clamp and gradually TORQUE by means of torque wrench set to maximum torque value indicated on outer surface of clamp, gently tapping clamp with mallet.

NOTE : When clamp is fully torqued, make certain that plain section of T screw is engaged into clamp lock by at least 5 mm (0.196 in.).

(4)Clamp marking

(a)To indicate that the clamps have been correctly torqued, a red paint mark of 2 x 8 mm (0.08 x 0.3 in.) approx. can be applied to the nut and trunnion or bolt.

ROUTING OF TELEFLEX CONTROL TUBES - BENDING

1. General

This section deals with the installation of TELEFLEX control tubes (bending).

2. Tube Routing

A. Three types of tube exist : (Ref. Fig. 001).

(1)Light-alloy tube DS 56-2

Generally used for low loads : 5 daN (11.24 lbf.) max. in tension and compression.

Temperature utilization range : - 40°C (- 40°F) + 70°C (+ 316.4°F).

(2)Tungum tube DS 307-2

The most commonly used, it can transfer loads up to 15 daN (33.72 lbf.) in compression and 25 daN (56.20 lbf.) in tension.

Temperature utilization range : - 54°C (- 65.2°F), + 300°C (+ 1061.6°F).

(3)Light-alloy - PTFE (Teflon) tube DS431.

This tube internally coated with Teflon is used for controls requiring high mechanical efficiency and good accuracy. It is capable of transmitting the same loads, 15 daN (33.72 lbf.) in compression and 25 daN (56.20 lbf.) in tension, as tube DS 307-2 but over longer lengths with complex routes and high operating cycles.

Over short distances the transmitted loads can be higher.

B. Tube Bending (Ref. Fig. 002)

The TELEFLEX tube will be bent cold by hand or with an appropriate tool to avoid flattening or crushing of tube.

An elbow can be obtained using a bending template ; templates will be made from a tube provided for this purpose, when the mock-up is made.

To bend tubes :

- introduce a suitable length of cable into tube (sacrificial cable),
- check that it slides freely in the tube,
- slowly bend, sliding tube over pulley so as to obtain correct radii,
- after bending, check again that cable slides freely,
- position bent tube and straight elements making up complete tube route, Readjust bends if applicable,
- clean inside of tubes with compressed air before installing.

TUBE REFERENCE	DS 56/2	DS 307/2	DS 431
ID.A (mm)	4.93	4.93	4.93
OD.B (mm)	6.9	6.9	6.9
MINIMUM BEND RADIUS (mm)	90	90	120
WEIGHT PER METER (g)	52	145	122
NORMAL LENGTH	2.5	2.5/3	2.5/3

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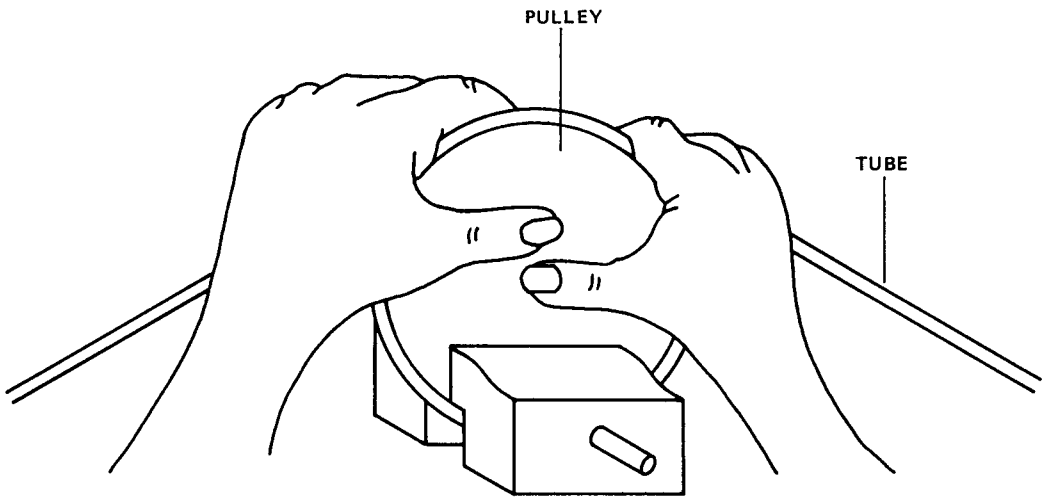
The tubes are always delivered cut to length and equipped with their attaching nuts. (The length are accurately defined when the mock-ups are made).

Tube Characteristics Table
Figure 001



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Tube Bending
Figure 002

PROTECTION FROM VIBRATION AND CHAFING OF HYDRAULIC PIPES

1. Equipment and Materials

ITEM	DESIGNATION
(1)Material No. 04-012	Common Greases (Ref. 20-31-00)
(2)Material No. 08-004	Bonding and Adhesive Compounds (Ref. 20-31-00)
(3)Material No. 19-002	Miscellaneous (Ref. 20-31-00)

2. Procedure

A. Minimum Distances Necessary to Prevent Chafing of Hydraulic Pipes. (Ref. Fig. 001)

(1)Pipes and hoses must not touch other pipes and hoses or adjacent components.

NOTE : It is permitted for hydraulic hoses that have blue textile antiabrasion sheaths to touch each other.

(2)The standard minimum distances you must have on hydraulic pipes/hoses routings are specified in this document.

NOTE : If a maintenance procedure specifies a different minimum distance, you must obey this distance.

R (3)The minimum distance between the affected hoses (between 2 systems)
R and between the hoses of one system should be 12 mm (0.47 in.).

(4)To measure the minimum distance between a pipe/hose and a part that can move :

- measure the distance in the condition where the movement decreases the distance to its smallest value.

B. Protection from Vibration and Chafing.

NOTE : When the clearance is less than the minimum distance, you can use lacing tape, bumpers, spacers and clamps :
- to get the minimum distance
- to prevent chafing.

NOTE : If you find that a spacer is missing, we recommend that you replace it with a pair of P-clamps NSA5516 or with lacing tape (P-clamps give the best protection from vibration).

NOTE : You must not attach hydraulic pipes (with lacing tape, bumpers, spacers and clamps) to pipes of other systems (air, fuel, water, etc.) or electrical harnesses.

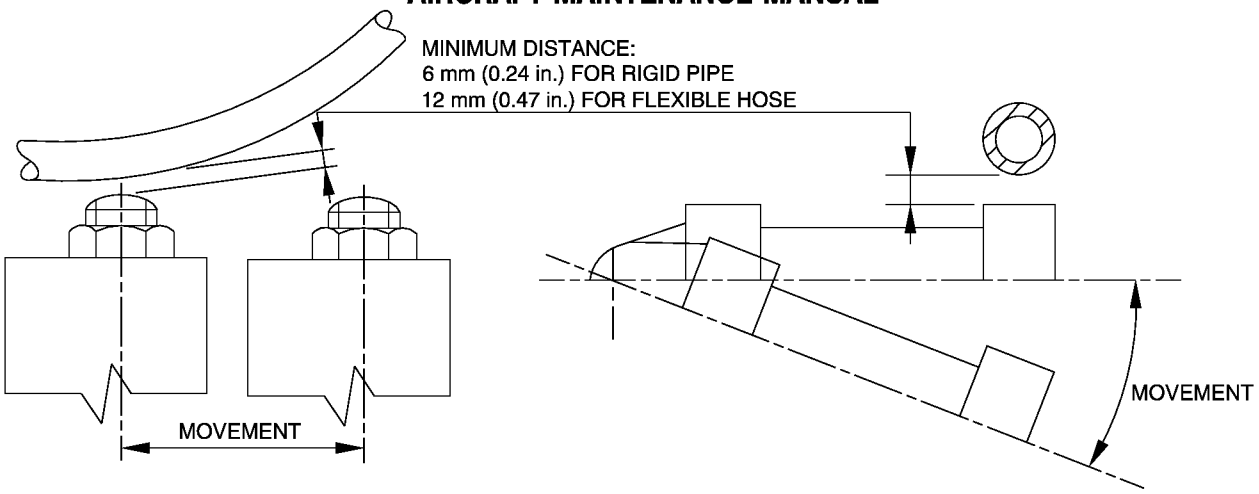
NOTE : You must identify the location where you attach the hydraulic pipes (with lacing tape, bumpers, spacers and clamps) with :
- identification tape ABS0653-05 or NSA0144-4 or
- white/red paint that is resistant to hydraulic fluid.

(1)Installation of lacing tape on pipe runs (Ref. Fig. 002)

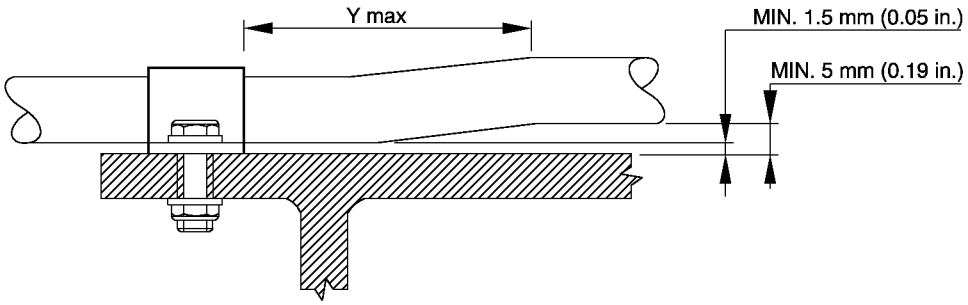
(a)Attach the lines with lacing tape (Material No. 19-002).

(b)Finish the lacing with a reef knot. Tighten the knot.

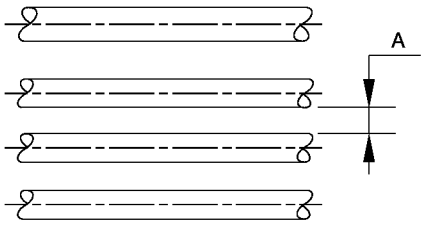
(c)Make sure that the minimum distance is correct :
- 2.5 mm (0.099 in.) min. for pipes in the same routing,
- 6 mm (0.236 in.) min. for pipes in different routings.



MINIMUM DISTANCE BETWEEN PIPES/HOSES AND PARTS THAN CAN MOVE



MINIMUM DISTANCE BETWEEN PIPES/HOSES AND STRUCTURE



ITEM	MINIMUM DISTANCE A mm	(in.)
FOR PIPES IN THE SAME ROUTING	2.5	(0.1)
FOR PIPES IN DIFFERENT ROUTINGS	6.0	(0.24)
BETWEEN A HOSE AND A PIPE	12.0	(0.47)
BETWEEN TWO HOSES	12.0	(0.47)

MINIMUM DISTANCE BETWEEN PIPES

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Minimum Distances
Figure 001

R

(d)Apply bonding and adhesive compounds (Material No. 08-004) on the reef knot and the ends of the lacing tape.

(e)Make the identification mark with identification tape ABS0653-05 or NSA0144-4 or with white/red paint resistant to hydraulic fluid.

(2)Installation of bumpers and spacers between pipes (Ref. Fig. 003)

NOTE : Install bumpers or spacers to prevent vibration and chafing :
- when the distance between fixed clamps is too long and,
- to maintain a minimum distance between two pipes.
This method is applicable for tension free installations.

(a)Apply a layer of bonding and adhesive compounds (Material No. 08-004) on one pipe.

(b)Install an applicable bumper NSA5586 (or a spacer NSA5527) between the two pipes.

Identification of spacers

Length of spacer in.	Length of spacer mm	Spacer P/N
0.142	3.6	NSA5527-03-07
0.190	4.83	NSA5527-03-04
0.25	6.35	NSA5527-03-03
0.312	7.93	NSA5527-03-05
0.375	9.52	NSA5527-03-06
0.453	11.5	NSA5527-03-16
0.5	12.7	NSA5527-03-01
0.551	14	NSA5527-03-14
0.598	15.2	NSA5527-03-02
0.669	17	NSA5527-03-15
0.748	19	NSA5527-03-12
0.787	20	NSA5527-03-08
0.827	21	NSA5527-03-13
0.886	22.5	NSA5527-03-09
0.925	23.5	NSA5527-03-11
1.831	46.5	NSA5527-03-10

(c)Install a cable tie NSA935401 over the layer of adhesive and the bumper (or the spacer) :
- NSA935401-08 for pipe DIA. 1"1/2 (38.1 mm) and 5/8 (15.87 mm),
- NSA935401-05 for other pipe diameters.

NOTE : You must use the applicable tool to install the cable tie. The cable tie must be sufficiently tight around the pipe but must not cause damage to the pipe (kinks or other damage).

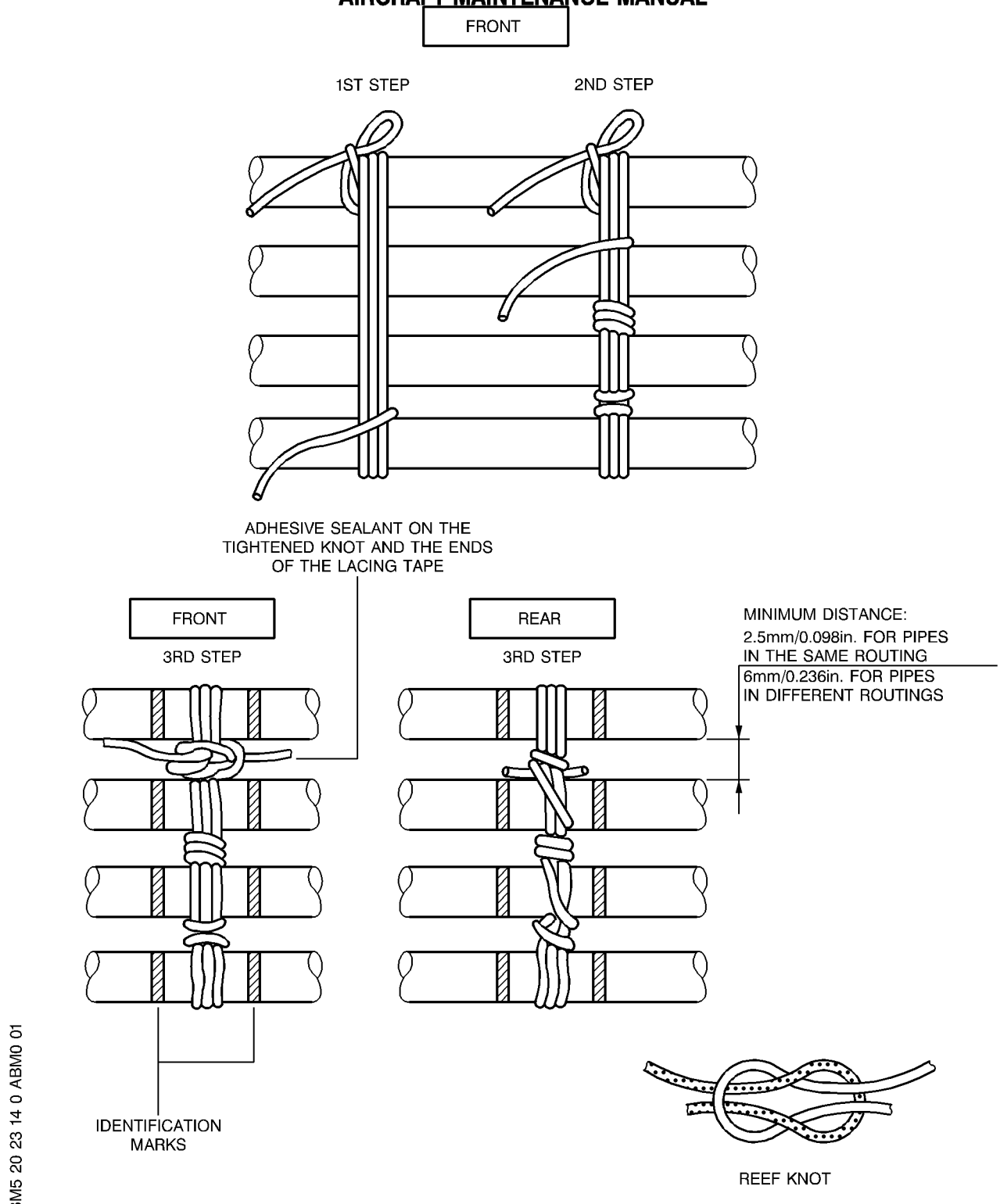
(d)Make the identification mark with identification tape ABS0653-05 or NSA0144-4 or with white/red paint resistant to hydraulic fluid.

(3)Installation of clamps or lacing tape to prevent chafing of pipes (Ref. Fig. 004)

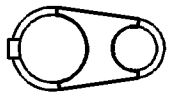
NOTE : We recommend that you use clamps in areas where there can be stress and/or vibration.

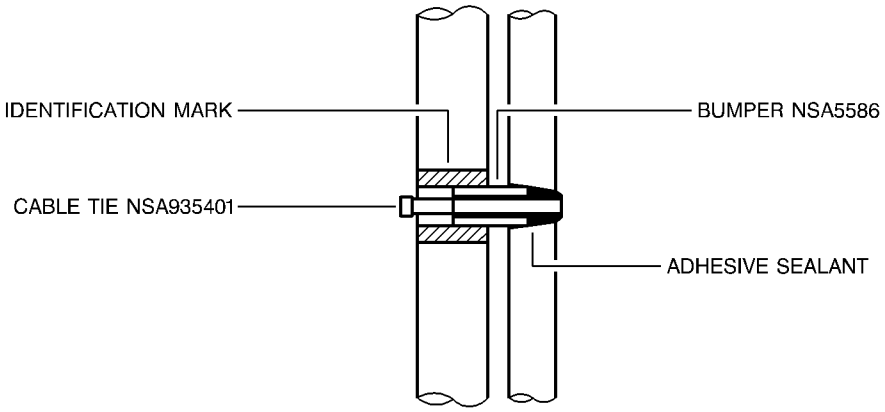
(a)Installation of clamps.

1 Find the applicable clamp installation for :

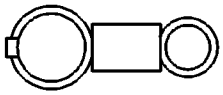


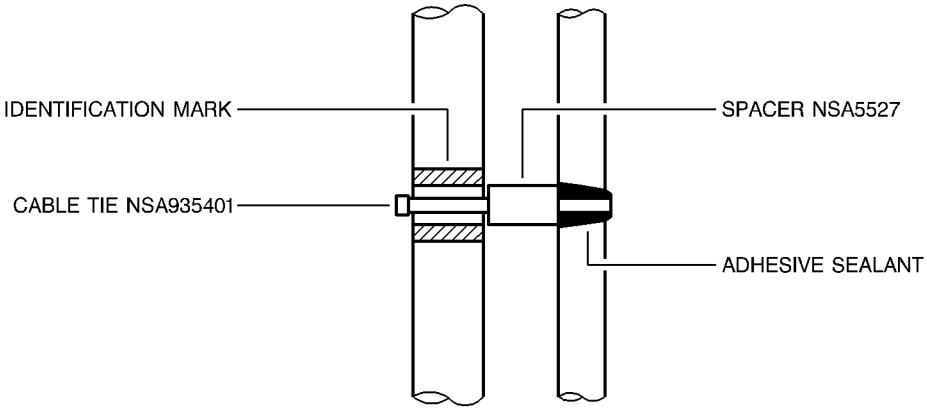
Installation of Lacing Tape on Pipe Runs
Figure 002





BUMPER BETWEEN TWO PIPES ATTACHED WITH A CABLE TIE





SPACER BETWEEN TWO PIPES ATTACHED WITH A CABLE TIE

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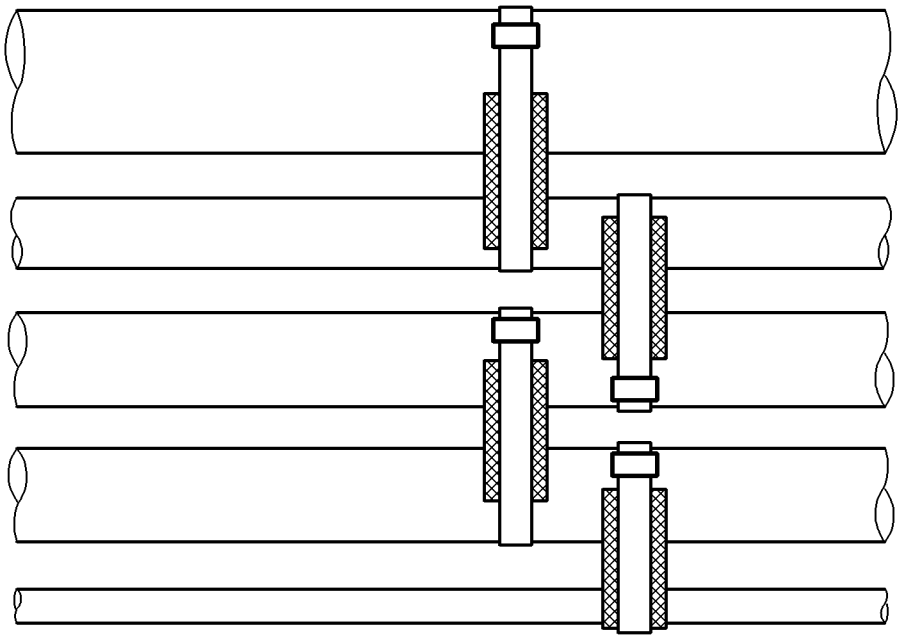
Installation of Bumpers and Spacers between Pipes
(Sheet 1/2)
Figure 003

R



EXAMPLE OF BUMPERS ON RUNS

TUBE DIA.	1/4	5/16	3/8	1/2	5/8	3/4	1"	1"1/2
1/4	A,C,D	A,C,D	A,C,D	A,C,D	A,C,D	A,C,D	A,C,D	B
5/16	A,C,D	A,C,D	A,C,D	A,C,D	A,C,D	A,C,D	B	B
3/8	A,C,D	A,C,D	A,C,D	A,C,D	A,C,D	B	B	B
1/2	A,C,D	A,C,D	A,C,D	A,C,D	B	B	B	B
5/8	A,C,D	A,C,D	A,C,D	B	B	B		
3/4	A,C,D	A,C,D	B	B	B	B		
1"	A,C,D	B	B	B	B			
1"1/2	B	B	B	B	B			

TABLE OF TUBE DIA/BUMPER TYPE
NSA5586A OR NSA5586B OR NSA5586C
OR NSA5586D

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Installation of Bumpers and Spacers between Pipes
(Sheet 2/2)
Figure 003

R

- the location of the pipes,
- the distance between the pipes.

Identification of P-clamps

Tube size	Tube DIA. in.	Tube DIA. mm	P-clamp P/N
-04	1/4	6.35	NSA5516CA06NJ
-06	3/8	9.525	NSA5516CA11NJ
-08	1/2	12.70	NSA5516CA14NJ
-10	5/8	15.875	NSA5516CA18NJ
-12	3/4	19.05	NSA5516CA23NJ
-16	1	25.40	NSA5516CA29NJ (*)
-20	1-1/4	31.75	N/A
-24	1-1/2	38.10	N/A

(*) You can only use P-clamps on size -16 return pipes. You must not use P-clamps on size -16 high pressure pipes.

2 Install the clamps on the pipes with the related hardware.

3 Make the identification mark with identification tape ABS0653-05 or NSA0144-4 or with white/red paint resistant to hydraulic fluid.

(b)Installation of lacing tape.

1 Apply a layer of bonding and adhesive compounds (Material No. 08-004) on one pipe.

2 Install the lacing tape (Material No. 19-002) over the adhesive and the two pipes.

3 Finish the lacing with a knot. Tighten the knot.

4 Apply bonding and adhesive compounds (Material No. 08-004) on the knot and the ends of the lacing tape.

5 Make the identification mark with identification tape ABS0653-05 or NSA0144-4 or with white/red paint resistant to hydraulic fluid.

(4)Installation of spiral strip (Ref. Fig. 005)

NOTE : If a pipe is too close to a fixed part (distance less than 5 mm (0.197 in.)), you can install a spiral strip attached with a cable tie at each end on the tube to prevent damage. This method is not applicable for parts that can move.

(a)Wind a spiral strip NSA849000 around the pipe.

(b)Install a cable tie NSA935401 at each end of the spiral strip.

(c)Make sure that the distance between the fixed part and the spiral strip is not less than 6.5 mm (0.26 in.) between hoses with 2 different systems and is not less than 1.5 mm (0.06 in.) between hoses with one system.

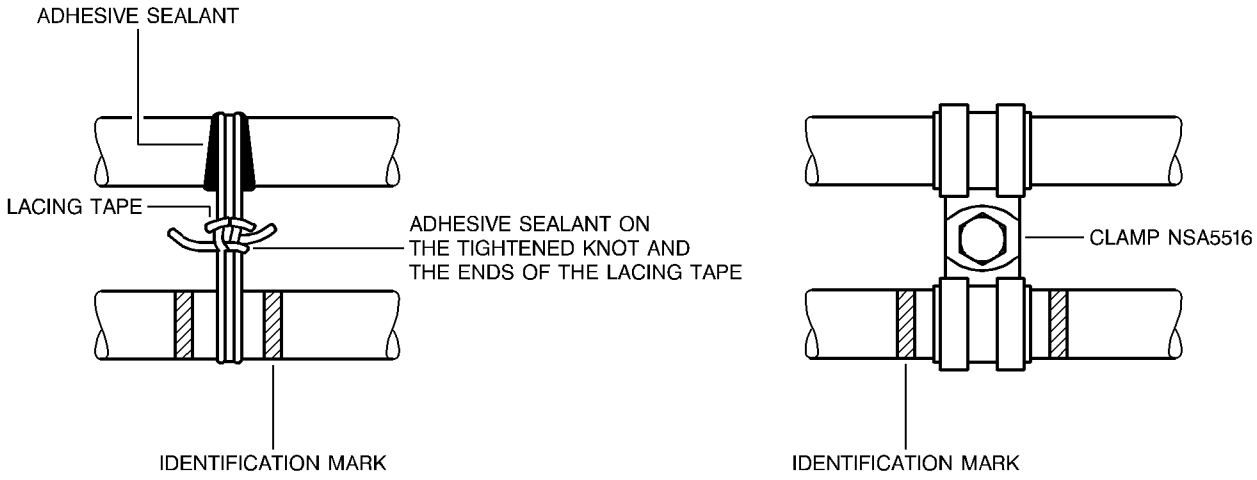
(5)Installation of grommets ABS0648 (Ref. Fig. 005)

(a)Before you install a grommet, apply common grease (Material No. 04-012) on the internal and external faces of the two parts. This makes correct installation of the grommet easier.

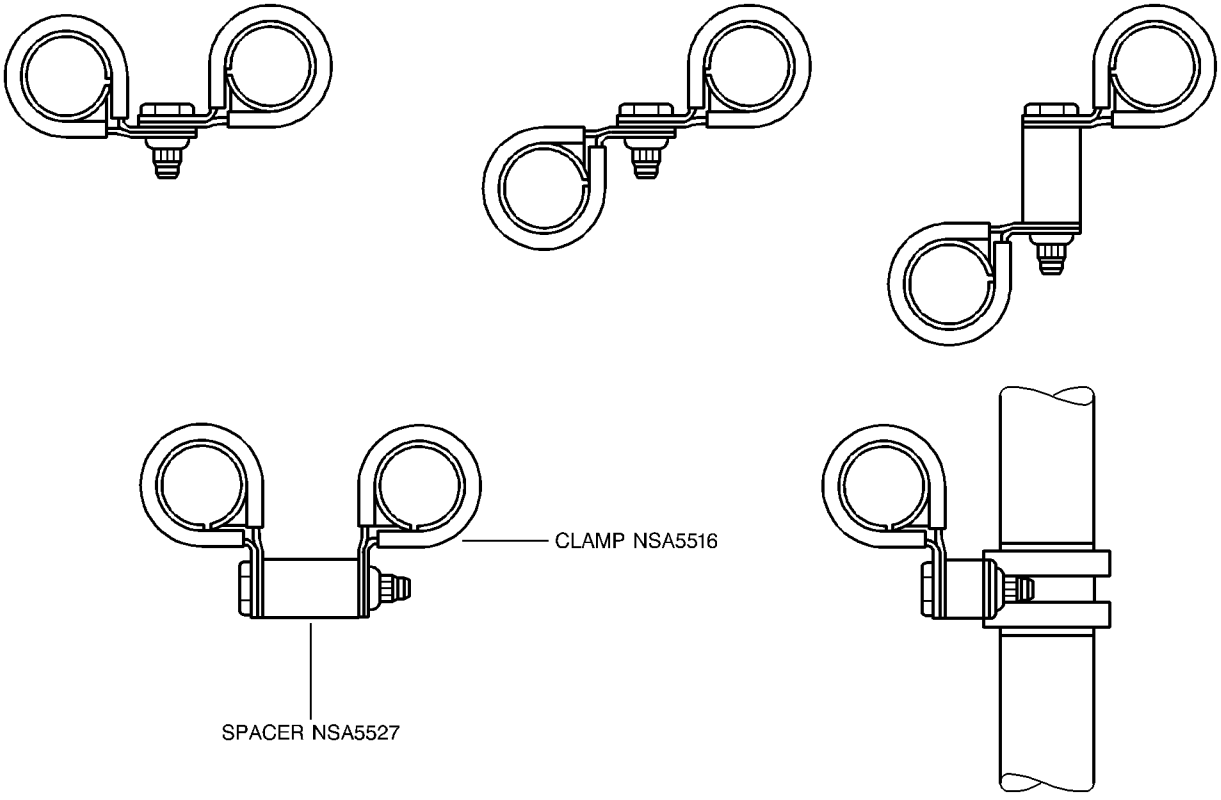
(b)During installation, make sure that :

- the pipe is centered on the grommet axis,
- the nose of the inner part is correctly installed on the outer part.

(c)After correct installation, the pipe can move approximately 15 Deg.



PROTECTION OF PIPES TO PREVENT CHAFING



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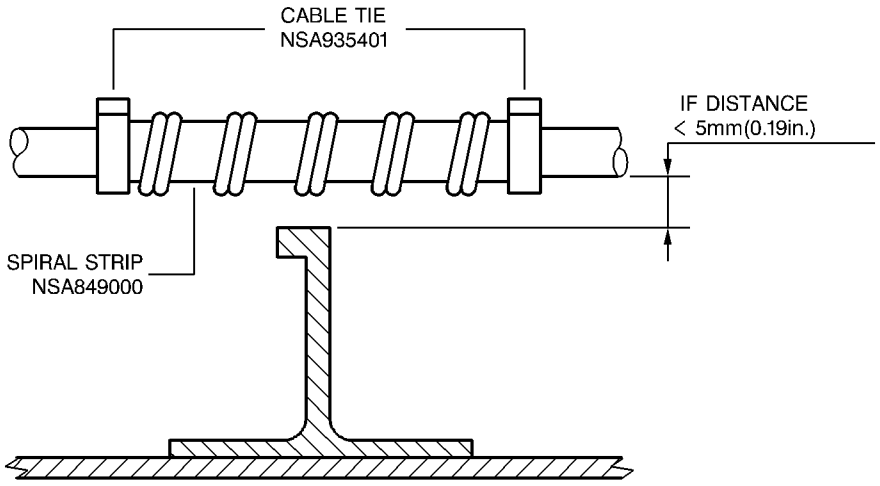
EXAMPLES FOR CLAMP POSITIONS

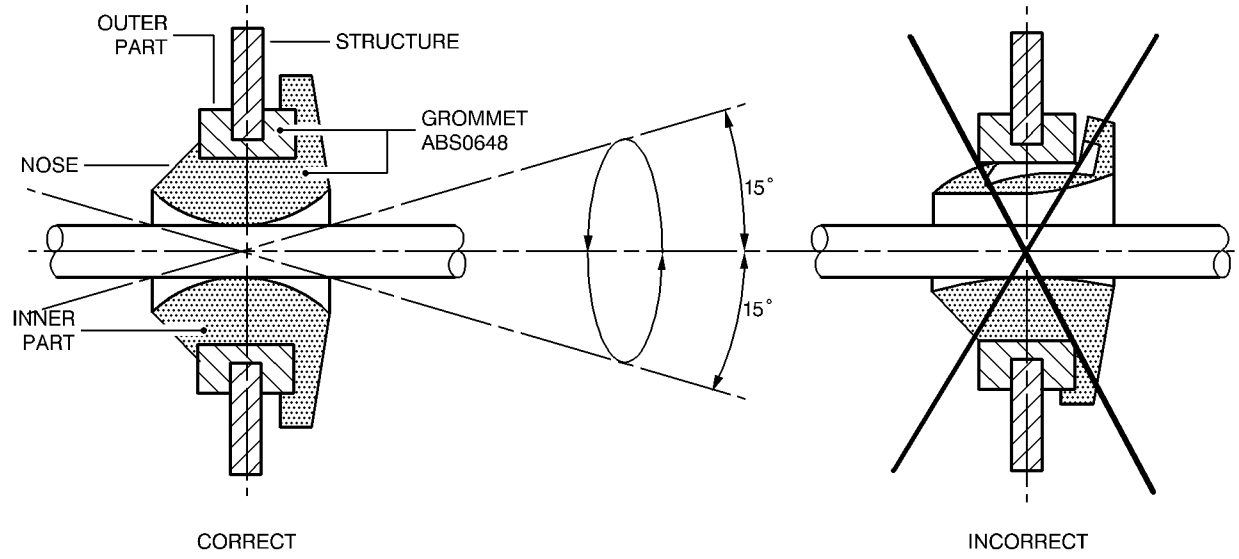
Installation of Clamps or Lacing Tape
Figure 004

R

in each direction.



INSTALLATION OF A SPIRAL STRIP ON A PIPE



INSTALLATION OF GROMMET ABS0648

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Installation of Spiral Strip and Grommets
Figure 005

INSTALLATION OF SWIVEL PLUG-IN UNIONS

1. Installation of Swivel Plug-In Unions and of O-Ring and Backup Washer on Swivel Plug-In Unions

A. General

This procedure gives the method to correctly install swivel plug-in unions.
A number of operators find much hydraulic leakage at these unions. This is because of damage to the seals in these unions during incorrect installation.

B. Procedure (Ref. Fig. 001, 002)

(1)Equipment and Materials

ITEM	DESIGNATION
(a)98A29103000000	Assembly Tool - Hydraulic Seals
(b)Material No. 02-003	Hydraulic Fluids
Referenced Procedure - 20-23-12, P. Block 1	Specified Torque Values for Unions

(2)Removal of the O-ring and backup washer

CAUTION : DO NOT USE POINTED, SHARP OR METAL TOOLS TO REMOVE THE O-RING AND BACKUP WASHER.
SHARP EDGES CAN CAUSE DAMAGE TO THE GROOVES OR CONTACT SURFACES OF THE UNION.

(a)Use a spoon-type removal tool or a wedge-type removal tool with a hook to remove the O-ring and the backup washer.

(b)Discard the O-ring and the backup washer.

(3)Installation of the backup washer and of the O-ring

CAUTION : DO NOT INSTALL THE REMOVED O-RING OR BACKUP WASHER AGAIN. YOU MUST ALWAYS INSTALL A NEW O-RING OR BACKUP WASHER BEFORE YOU INSTALL A REMOVED UNION. A COMPRESSED SEAL WILL NOT GO BACK TO ITS INITIAL CONDITION.

(a)Safety precautions

1 Before you start the installation, make sure that you have the correct P/Ns.

R - O-ring: NAS1612-XX or NAS1602-XX,
R or
R - O-ring: EN6075 or EN6076,
- locknut: AN6289-XX,
- backup washer: MS28777-XX (leather) or MS28773-XX (teflon).

NOTE : We recommend the installation of the teflon backup washer (MS28773-XX).

2 Make sure that the parts you install are clean and not damaged.

3 Before you install the seals, make sure that the union is not damaged:
- discard the union if it has scratches or if the groove of the O-ring is damaged.

(b)Installation of the backup washer

1 Lightly lubricate the threads of the locknut with HYDRAULIC FLUIDS (Material No. 02-003).
2 Turn the locknut until it is on the second row of threads with the recess on the nose side of the union.
3 Align the bottom of the recess with the start of the threads.
4 Get the installation tool applicable to the diameter of the union and install it on the union.
5 Move the backup washer on the sleeve until the inner diameter touches the conical end of the sleeve.
NOTE : If you use a leather backup washer, the rough face must be on the locknut recess side and the smooth face on the O-ring side.
6 Move the pusher on the sleeve until it touches the backup washer.
7 Gradually push the pusher until the backup washer goes into the recess of the locknut.
8 Remove the installation tool.
9 Get the knurled ring applicable to the diameter of the union.
10 Adjust and push the backup washer into the bottom of the locknut recess (hold the locknut so that it does not turn).
11 Remove the knurled ring.
12 Make sure that the backup washer is correctly installed in the nut recess.

(c)Installation of the O-ring
1 Lubrication of the O-ring:
CAUTION : ONLY USE HYDRAULIC FLUID MATERIAL NO. 02-003 TO LUBRICATE THE O-RINGS.
- Immerse the O-ring in HYDRAULIC FLUIDS (Material No. 02-003) for a minimum of a quarter of an hour.
- Lightly apply HYDRAULIC FLUIDS (Material No. 02-003) to the conical end of the sleeve.
2 Move the O-ring on the sleeve until its inner diameter touches the conical end of the sleeve.
3 Move the pusher on the sleeve until it touches the O-ring.
4 Gradually push the pusher until the O-ring goes into the groove of the union.
5 Remove the installation tool.
6 Make sure that the O-ring is in the correct position without any torsion or damage.

(4)Installation of the union
(a)Lightly apply HYDRAULIC FLUIDS (Material No. 02-003) on the first row of threads of the union.
(b)Turn the union and the locknut at the same time until the backup washer comes into contact with the equipment.
NOTE : The union must turn freely in the equipment or manifold port.
(c)Turn the union and the locknut at the same time a maximum of one turn to align the union with the pipe.
(d)Connect and tighten the related pipe (Ref. 20-23-12, P. Block 1).
(e)Hold the union with an open-ended spanner and TORQUE the locknut to the applicable value (Ref. 20-23-12, P. Block 1).

DIA	TOOL-SET P/N: 97 A 29103000000
	TOOL P/N
1" 1/2	98 A 29103000100
1" 1/4	98 A 29103000102
1"	98 A 29103000104
3/4	98 A 29103000106
5/8	98 A 29103000108
1/2	98 A 29103000110
3/8	98 A 29103000112
1/4	98 A 29103000114
5/16	98 A 29103000116
3/16	98 A 29103000118

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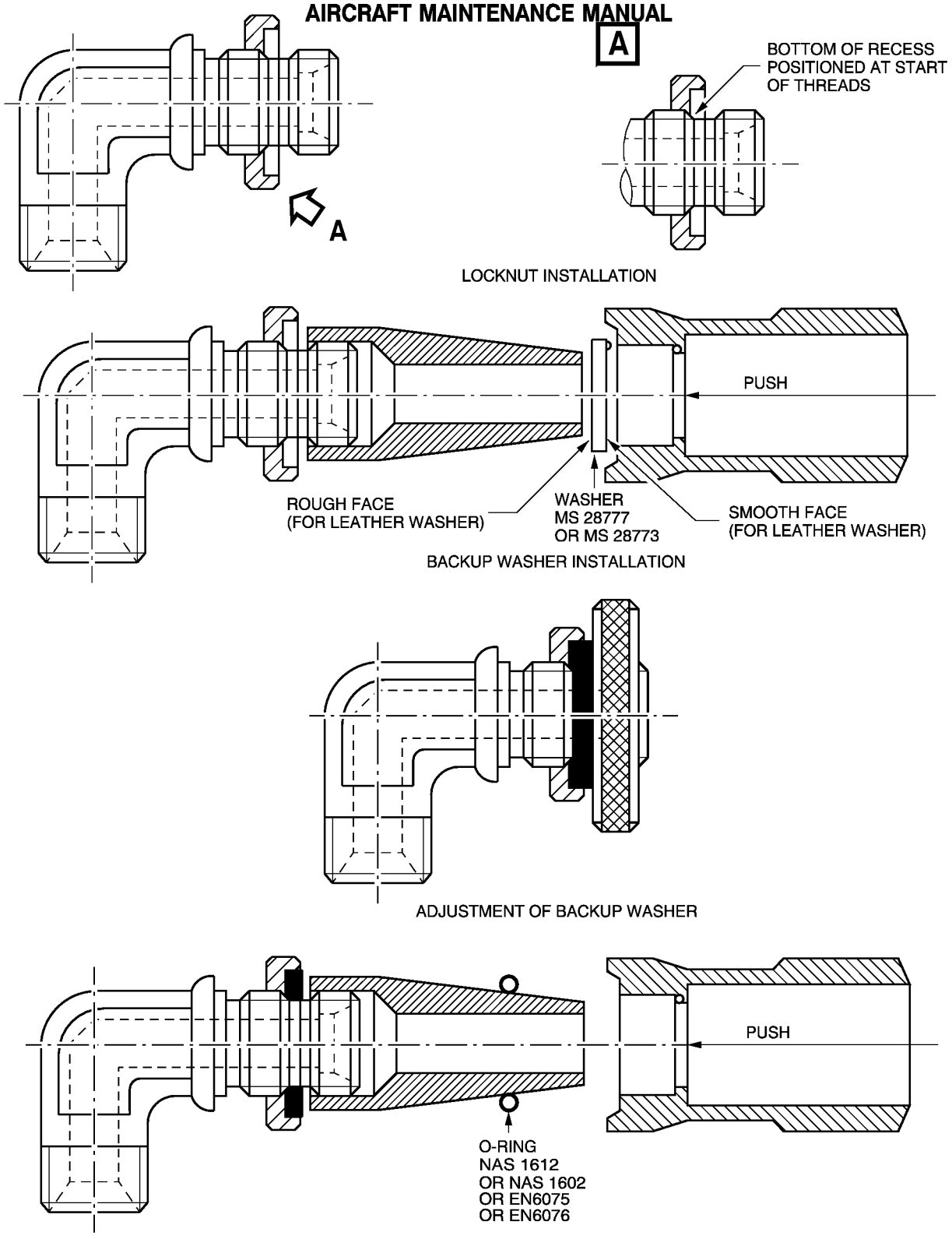
Identification of Equipment
Figure 001

R



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Installation of Swivel Plug-in Unions
Figure 002

R

INSTALLATION OF THE O-RING SEAL

1. General
   This procedure is only applicable for the installation of an O-ring on a plug-in union or a manifold plug of hydraulic systems.

2. Procedure
   A. Equipment and Materials.

ITEM	DESIGNATION
(1)98A29103000000	Assembly Tool - Hydraulic Seals
(2)Material No. 02-003	Hydraulic Fluids (Ref. 20-31-00)
Referenced Procedure - 20-23-12, P. Block 1	Specified Torque Values for Unions

   B. Removal of the O-ring
      CAUTION : DO NOT USE POINTED, SHARP OR METAL TOOLS TO REMOVE THE O-RING. SHARP EDGES CAN CAUSE DAMAGE TO THE UNION/PLUG (GROOVES OR SEAL CONTACT SURFACES).
      (1)Use spoon-type removal tools or a wedge-type removal tool with a hook to remove the O-ring.
      (2)Discard the O-ring.

   C. Installation of the O-ring (Ref. Fig. 001)
      CAUTION : DO NOT INSTALL THE REMOVED O-RING AGAIN. YOU MUST ALWAYS INSTALL A NEW O-RING BEFORE YOU INSTALL A REMOVED UNION/PLUG AGAIN. A COMPRESSED SEAL WILL NOT GO BACK TO ITS INITIAL CONDITION.
      (1)Safety precautions
         (a)Before the installation, make sure that the P/N of the O-ring is correct:
R   - O-ring: NAS1612-XX or NAS1602-XX,
R   or
R   - O-ring: EN6075 or EN6076.
         (b)Make sure that the parts you install are clean and not damaged.
         (c)Before you install the O-ring, make sure that the union/plug is not damaged:
            - discard the union/plug when it has scratches or when the groove of the O-ring is damaged.
      (2)Installation on unions/plugs
         (a)Get the O-ring installation tool applicable to the diameter of the union/plug.
         (b)Install the union/plug on the tool:
            - move the union/plug on the sleeve (1).
         (c)Lubrication
            CAUTION : ONLY USE HYDRAULIC FLUID MATERIAL NO. 02-003 TO LUBRICATE THE O-RINGS.
            1_ Put the O-ring fully into HYDRAULIC FLUIDS (Material No. 02-003) for a minimum of a quarter of an hour before you install it on the union/plug.
            2_ Lightly apply HYDRAULIC FLUIDS (Material No. 02-003) to the conical

end of the sleeve (1).

(d)Move the O-ring on the sleeve (1) until it touches the conical end of the sleeve.

(e)Move the pusher (2) on the sleeve (1) until it touches the O-ring.

(f)Push the pusher until the O-ring is in the correct position in the groove of the union/plug.

(g)Make sure that the O-ring is in the correct position without any torsion or damage.

(h)Remove the tool.

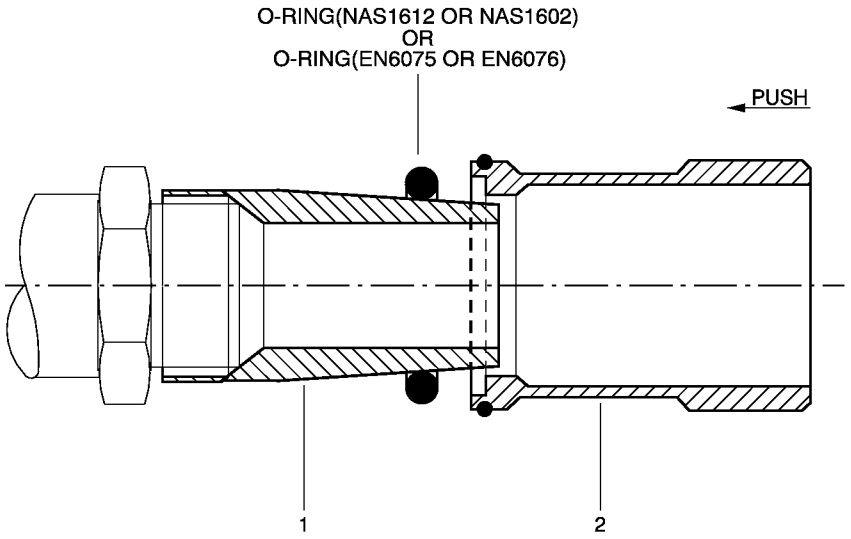
D. Installation of the Union/Plug on the Equipment

(1)Lightly apply HYDRAULIC FLUIDS (Material No. 02-003) on the threaded part of the union/plug.

(2)Install the union/plug on the equipment and tighten manually.

NOTE : The union/plug must turn freely in the equipment or manifold port.

(3)TORQUE the union/plug to the applicable value (Ref. 20-23-12, P. Block 1).



DIA	TOOL-SET P/N: 97 A 29103000000
	TOOL P/N
1" 1/2	98 A 29103000100
1" 1/4	98 A 29103000102
1"	98 A 29103000104
3/4	98 A 29103000106
5/8	98 A 29103000108
1/2	98 A 29103000110
3/8	98 A 29103000112
1/4	98 A 29103000114
5/16	98 A 29103000116
3/16	98 A 29103000118

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R

Installation of the O-Ring Seal
Figure 001

CORROSION INHIBITING PROTECTION FOR STEEL HYDRAULIC TUBES

1. General

This procedure is applicable only to protect the steel hydraulic tubes.

2. Procedure

A. Equipment and Materials.

ITEM	DESIGNATION
(1)Material No. 08-052	Bonding and adhesive compounds (Ref. 20-31-00)
(2)Material No. 08-074	Bonding and adhesive compounds (Ref. 20-31-00)
(3)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
(4)Material No. 11-026	Cleaning Agents (Ref. 20-31-00)
(5)Material No. 15-009	Storage Preservations (Ref. 20-31-00)
(6)Material No. 19-003	Miscellaneous (Ref. 20-31-00)
(7)Material No. 19-011	Miscellaneous (Ref. 20-31-00)

B. Preparation for Tubing Protection

(1)If any, remove the corrosion products with scotch brite pads (Material No. 19-011) without reducing the thichness of the tube before apply the STORAGE PRESERVATIONS (Material No. 15-009).

(2)Clean the tube with a lint-free cotton cloth (Material No. 19-003) made moist with CLEANING AGENTS (Material No. 11-026) or (Material No. 11-002).

- The surface must be clean and without damage.

C. Application of the Corrosion Preventive Compound

WARNING : BE CAREFULL WHEN YOU USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER MATERIALS. OBEY THE MATERIAL MANUFACTURER'S INSTRUCTIONS AND THE LOCAL REGULATIONS.
MAKE SURE THAT THERE IS A GOOD FLOW OF AIR THROUGH THE WORK AREA.
DO NOT BREATHE THE FUMES.
DO NOT SMOKE.
DO NOT USE THESE MATERIALS NEAR A FLAME, SPARKS OR SOURCES OF HEAT.
USE PROTECTIVE CLOTHING, GOGGLES AND GLOVES.
IF YOU GET ONE OF THESE MATERIALS:
- ON YOUR SKIN OR IN YOUR EYES, FLUSH IT AWAY WITH A FLOW OF WATER.
- IN YOUR MOUTH, GET IMMEDIATE MEDICAL AID.
IN GENERAL, THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.

(1)If any, protect the following equipment against contamination in the area of the tube:

- Electrical/electronic equipment and connectors
- Kinematic systems
- Air conditionning systems
- Oxygen systems
- Waster/waste systems

- Cockpit and electronic bay
- Greases, oils and waxes.

NOTE: The characteristics of the greases, oils and waxes may change in contact with the solvent.

(a)Make sure that the covering/masking material is sufficiently resistant to the solvents contained in the **STORAGE PRESERVATIONS (Material No. 15-009)**.

You can use:

- **BONDING AND ADHESIVE COMPOUNDS (Material No. 08-052)**
- **BONDING AND ADHESIVE COMPOUNDS (Material No. 08-074)**

(2)Apply **STORAGE PRESERVATIONS (Material No. 15-009)** on the tube, either with a brush or sprayed on when the product is supplied in aerosol can.

(a)Make sure that you applied the treatment under a uniform coating along the tube.

(3)Remove the covering/masking material.

REMOVAL/INSTALLATION OF THE BOBBINS FROM THEIR HOUSINGS AND INSTALLATION OF O-RINGS, SQUARE SEALS AND BACK-UP RINGS ON THE BOBBINS

1. Equipment and Materials

ITEM	DESIGNATION
(1)97A29102090000	Tool Set-Bobbin and Seal Removal/Installation
(2)Material No. 02-003	Hydraulics Fluids (Ref. 20-31-00)
(3)Material No. 04-015	Common Greases (Ref. 20-31-00)

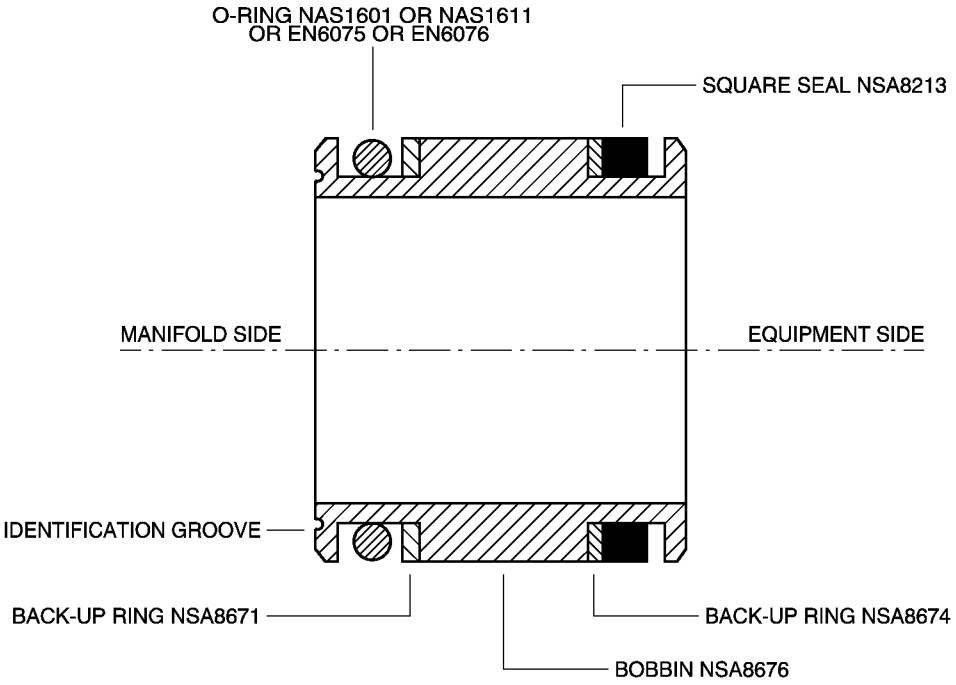
2. Procedure

A. Equipment
(Ref. Fig. 001)
(1)Tool set-bobbin and seal removal/installation (97A29102090000).

B. Removal of Bobbins from their Housings
(Ref. Fig. 002)
(1)Removal of bobbins (from 1/4" dia to 1/2" dia)
(a)Get the removal tool applicable to the diameter of the bobbin that you remove.
(b)Make sure that the tool is correctly set:
- 34 mm (1.33 in.) for bobbin from 1/4" dia to 3/8" dia
- 40 mm (1.57 in.) for bobbin of 1/2" dia.
(c)Put the compression bushing (1) of the tool into the bobbin that you remove.
(d)Hold the nut (3) of the tool and turn the body (2) until the bobbin is locked on the tool.
(e)Pull the tool to remove the bobbin from its housing.
(2)Removal of bobbins (from 5/8" dia to 1" dia)
(a)Get the removal tool applicable to the diameter of the bobbin that you remove.
(b)Put the compression bushing (1) of the tool into the bobbin that you remove.
(c)Hold the body (2) of the tool and turn the nut (3) until the bobbin is locked on the tool.
(d)Pull the tool to remove the bobbin from its housing.

C. Removal of O-Ring, Square Seal and Back-Up Rings
CAUTION : DO NOT USE POINTED, SHARP OR METAL TOOLS TO REMOVE THE O-RING OR SQUARE SEAL OR BACK-UP RINGS. SHARP EDGES CAN CAUSE DAMAGE TO THE BOBBINS (GROOVES OR SEAL CONTACT SURFACES).
(1)Use spoon-type removal tools or a wedge-type removal tool with a hook to remove the O-ring, the square seal and the back-up rings.
(2)Discard the O-ring, the square seal and the back-up rings.

D. Installation of O-Ring, Square Seal and Back-up Rings
(Ref. Fig. 003)
CAUTION : DO NOT INSTALL REMOVED O-RINGS, SQUARE SEALS AND BACK-UP RINGS AGAIN.



BOBBIN NSA	MANIFOLD SIDE		EQUIPMENT SIDE		TOOL SET P/N: 97A29102090000	
	O-RING NAS DASH N°	BACK-UP RING NAS DASH N°	SQUARE SEAL NAS DASH N°	BACK-UP RING NAS DASH N°	TOOL DIA	TOOL P/N
4	010	4	4	4	1/4	97A29102090700
5	011	5	5	5	5/16	97A29102090600
6	012	6	6	6	3/8	97A29102090500
8	112	8	8	8	1/2	97A29102090400
10	113	10	10	10	5/8	97A29102090300
12	115	12	12	12	3/4	97A29102090200
16	119	16	16	16	1"	97A29102090100

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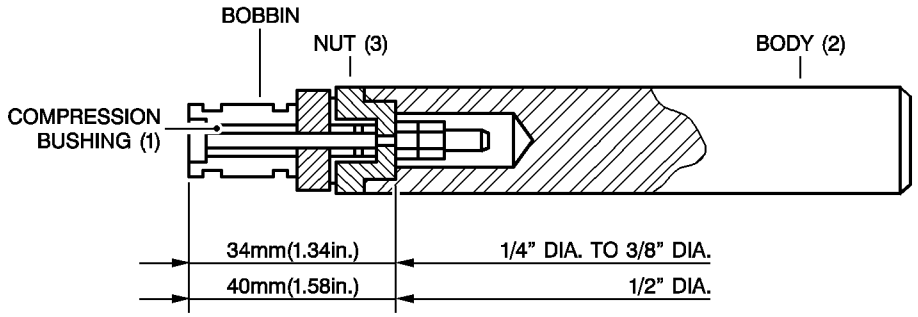
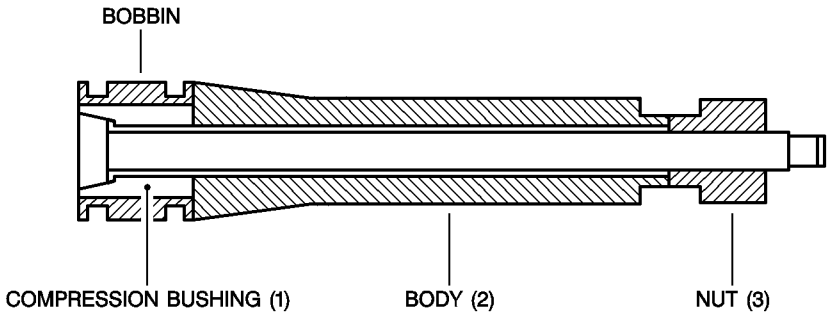
R Identification of Bobbins and Tools
Figure 001

TOOL FOR 1/4" DIA. TO 1/2" DIA. BOBBINS



TOOL FOR 5/8" DIA. TO 1" DIA. BOBBINS



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Removal/Installation of Bobbins in Housings
Figure 002

YOU MUST ALWAYS REPLACE THE O-RING, SQUARE SEAL AND THE BACK-UP RINGS ON A REMOVED BOBBIN BEFORE YOU INSTALL IT AGAIN. A COMPRESSED SEAL WILL NOT GO BACK TO ITS INITIAL CONDITION.

NOTE : Operators could cut back-up rings to make their installa-tion on bobbins easier. But back-up rings incorrectly cut can cause leaks.
To prevent this, back-up rings are now delivered cut and we strong-ly recommend their use.

NOTE : The installation procedure is the same for the O-ring, the square seal and the back-up rings.

(1)Safety precautions

(a)Before the installation, make sure that the references of the parts you install on the bobbin are correct (Ref. Fig. 003).

1 Manifold side (bobbin identification groove side)

R - O-ring: NAS1611-XX or NAS1601-XX,
R or
R - O-ring: EN6075 or EN6076,
- back-up ring: NSA8671-XX.

2 Equipment side
- square seal: NSA8213-XX,
- back-up ring: NSA8674-XX.

(b)Make sure that the parts you install are not damaged.

(c)Make sure that you install the parts in the correct position and in this sequence:
- install the back-up rings in the grooves before you install the seals.
- install the O-ring on the identification groove side of the bobbin (manifold side).

(d)Before you install the seals, make sure that the bobbin is not damaged:
- discard the bobbin when it has scratches or when the grooves of the seals are damaged.

(2)Installation on bobbins

(a)Get the seal installation tool applicable to the diameter of the bobbin.

(b)Install the bobbin on the tool:

1 Tool for bobbin from 1/4" dia to 1/2" dia:
- slide the bobbin onto the sleeve (1).

2 Tool for bobbin from 5/8" dia to 1" dia:
- slide the bobbin onto the compression bushing of the tool.
- tighten the nut (3) until the bobbin is locked on the tool.

(c)Lubrication

CAUTION : ONLY USE LUBRICANT MATERIAL No. 04-015 OR HYDRAULIC FLUID MATERIAL No. 02-003 TO LUBRICATE THE SEALS.

NOTE : If you lubricate the seal with hydraulic fluid Material No. 02-003, it is necessary to immerse the seal into hydraulic fluid for a minimum of a quarter of an hour before you install it on the bobbin.

1 Lightly apply lubricant Material No. 04-015 on the O-ring (or the square seal) or immerse the O-ring (or the square seal) into hydraulic fluid Material No. 02-003 for a minimum of a quarter of an hour.

2 Lightly apply lubricant Material No. 04-015 or hydraulic fluid Material No. 02-003 to the conical end of the sleeve (1).

(d)Slide the O-ring (or the square seal or the back-up ring) onto the sleeve (1) until it touches the conical end of the sleeve.

(e)Slide the pusher (2) onto the sleeve (1) until it touches the O-ring (or the square seal or the back-up ring).

(f)Push the pusher until the O-ring (or the square seal or the back-up ring) is in the correct position in the groove of the bobbin.

(g)Make sure that the O-ring (or the square seal or the back-up ring) is in the correct position without any torsion or damage.

(h)Remove the tool.

E. Installation of Bobbins in their Housings
(Ref. Fig. 002)

(1)Installation of bobbins (from 1/4" dia to 1/2" dia)

(a)Make sure that the bobbin is clean.

(b)Get the installation tool applicable to the diameter of the bobbin that you install.

(c)Make sure that the tool is correctly set:
- 34 mm (1.33 in.) for a bobbin from 1/4" dia to 3/8" dia
- 40 mm (1.57 in.) for a bobbin of 1/2" dia.

(d)Put the compression bushing (1) of the tool into the bobbin that you install.

(e)Hold the nut (3) of the tool and turn the body (2) until the bobbin is locked on the tool.

(f)Lightly apply lubricant 04-015 or hydraulic fluid 02-003 to the seals of the bobbin.

(g)Align the bobbin with its housing and push on the tool to slide the bobbin into its housing.

NOTE : Make sure that the groove side of the bobbin is installed into the manifold.

(h)Remove the tool.

(i)Make sure that the bobbin is correctly installed.

(2)Installation of bobbins (from 5/8" dia to 1" dia)

(a)Make sure that the bobbin is clean.

(b)Get the installation tool applicable to the diameter of the bobbin that you install.

(c)Put the compression bushing (1) of the tool into the bobbin that you install.

(d)Hold the body (2) of the tool and turn the nut (3) until the bobbin is locked on the tool.

(e)Lightly apply lubricant 04-015 or hydraulic fluid 02-003 to the seals of the bobbin.

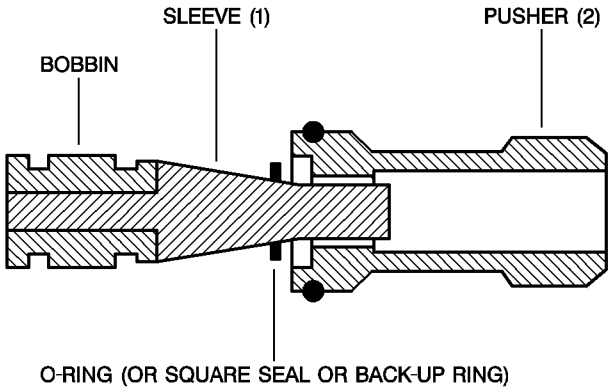
(f)Align the bobbin with its housing and push on the tool to slide the bobbin into its housing.

NOTE : Make sure that the groove side of the bobbin is installed into the manifold.

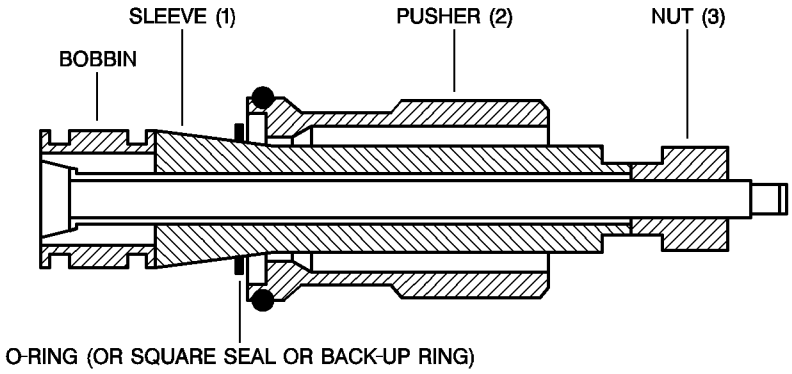
(g)Remove the tool.

(h)Make sure that the bobbin is correctly installed.

INSTALLATION OF SEALS ON BOBBINS FROM 1/4 "DIA. TO 1/2" DIA.



INSTALLATION OF SEALS ON BOBBINS FROM 5/8 "DIA. TO 1" DIA.



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Installation of O-Rings (or Square Seals or Back-up Rings on Bobbins)
Figure 003

MARKING OF TIGHTENED UNIONS

1. Marking of the Unions after Standard or Specific Tightening Torque Application

A. General

After you tighten an union on a hydraulic or crew oxygen system, you must identify it with a red painted line :
- this identifies a tightened union
- this shows possible loosening of the union.

B. Procedure

(1)Equipment and materials

ITEM	DESIGNATION
(a)Material No. 11-003	Cleaning Agent (Ref. 20-31-00)
(b)Material No. 11-005	Cleaning Agent (Ref. 20-31-00)
(c)Material No. 15-008	Storage Preservation (Ref. 20-31-00)
(d)Material No. 16-003	Structure Paints (Ref. 20-31-00)
(e)Material No. 16-018	Structure Paints (Ref. 20-31-00)

(2)Precautions

(a)Before you do this procedure, make sure that :
- you have tightened the related union to the applicable torque value
- you have done the applicable leakage test.

(3)Marking of the unions (Ref. Fig. 001)

(a)Hydraulic Systems

1 Clean the surfaces to be marked with **CLEANING AGENTS** (Material No. 11-003).

NOTE : If you install components again, you must remove the old red line before you apply a new red line.

2 Make a mark on the union with one 2 mm (0.0787 in.) to 4 mm (0.1574 in.) wide line with **STRUCTURE PAINTS** (Material No. 16-003) or **STRUCTURE PAINTS** (Material No. 16-018) (red color) applied with a brush. Let dry.

3 Apply **STORAGE PRESERVATION** (Material No. 15-008) on cadmium-plated steel union.

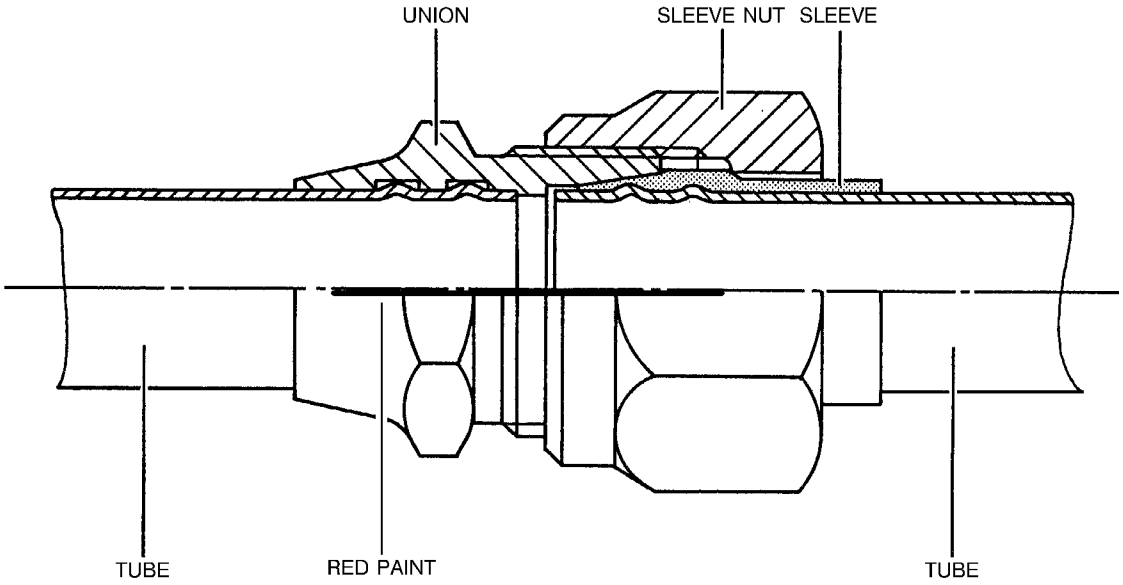
(b)Crew oxygen system

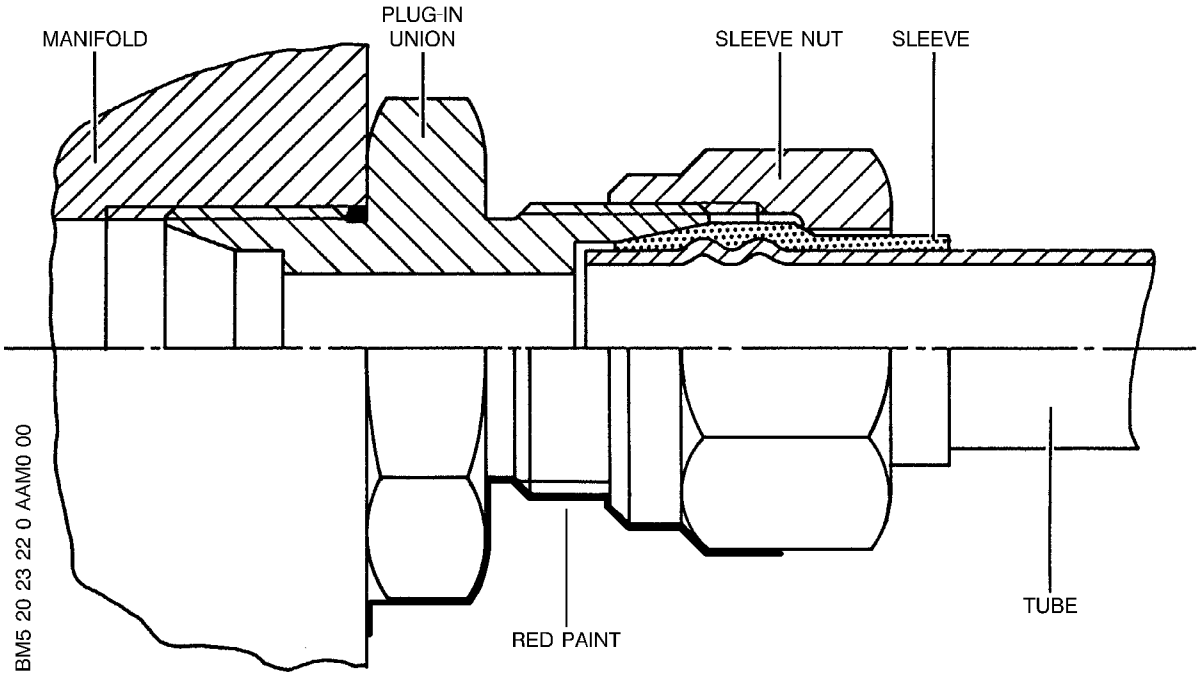
1 Clean the surface to be marked with **CLEANING AGENTS** (Material No. 11-005).

NOTE : If you install components again, you must remove the old red line before you apply a new red line.

2 Make a mark on the union with one 2 mm (0.0787 in.) to 4 mm (0.1574 in.) wide line with **STRUCTURE PAINTS** (Material No. 16-003) (red color) applied with a brush. Let dry.

(4)Make sure that the work area is clean and clear of tool(s) and other items.





Example of Marking of Unions
Figure 001

1. General

This topic deals with the repair of the potable water system tubing on the aircraft and in the workshop, and the precautions to be observed during installation.

CAUTION : THE TUBING MUST BE CAREFULLY HANDLED SO AS TO PREVENT, DENTS, DISTORSION AND SCRATCHES.

2. Reasons for the Job

A. Removal of the potable water system tubing.

B. Repair of the potable water system tubing using HARRISON fittings to be carried out in the workshop.

C. Repair of the potable water system tubing using the PERMASWAGE repair procedure, to be carried out in the aircraft.

D. Repair of the potable water system tubing with H-fittings to be carried out in the aircraft.

E. Temporary repair of the potable water system tubing with MS21922 sleeves to be carried out in the workshop.

F. Installation of the potable water system tubing and air supply lines.

3. Removal of the Potable Water System Tubes and Air Supply Lines

A. Equipment and Materials

ITEM	DESIGNATION
A.	Blanking Caps
B.	Chipless Cutter
C.	Container
D.	Warning Notice

Referenced Procedures

- 12-24-38, P. Block 1	Potable Water System - Draining
- 24-41-00, P. Block 301	AC External Power Control
- 38-40-00, P. Block 301	Air Supply

B. Procedure

(1)Job set-up

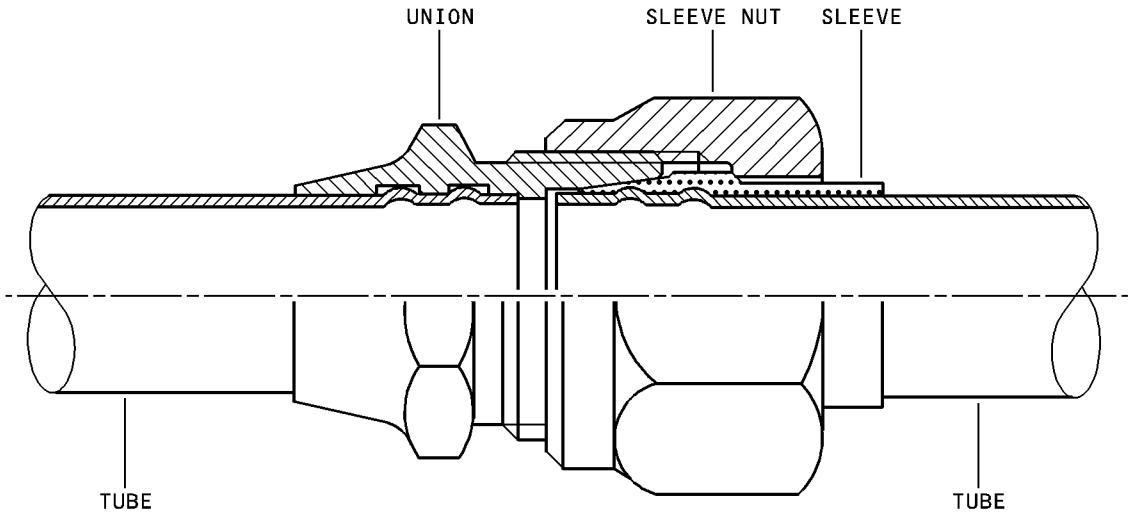
(a)Energize the ground service network (Ref. 24-41-00, P. Block 301).

(b)Depressurize the potable water system (38-40-00, P. Block 301).

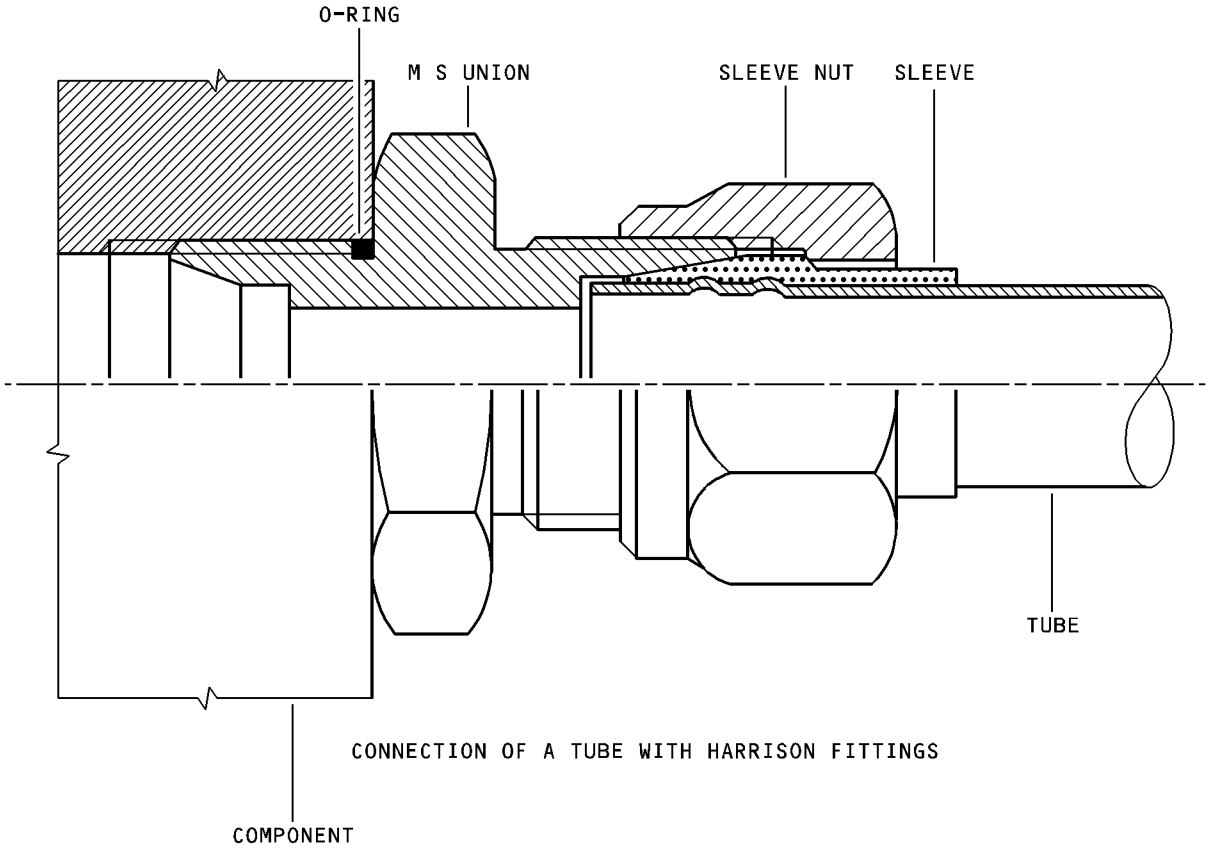
(c)Drain the potable water system (12-24-38, P. Block 1).

(d)Put a warning notice in position to tell the personnel not to fill or pressurize the potable water system.

(2)Removal of the tube assembly fitted with **HARRISONS** sleeves and unions (Ref. Fig. 201).
  (a)Remove the potable water de-icing elements as necessary.
  (b)Put a container in position below the potable water line to collect any unwanted water.
  (c)Carefully loosen the sleeve nut, disconnect and remove the tube assembly.
  (d)Put blanking caps on the line ends.
(3)Removal of Tube Section with **PERMASWAGE** Fittings (Ref. Fig. 202).
  (a)Remove the potable water de-icing elements as necessary.
  (b)Put a container in position below the potable water line to collect any unwanted water.
  (c)Cut the tube end or section with a chipless cutter (Ref. Fig. 203).
  (d)Remove the tube end or section.
  (e)Put blanking caps on the line ends.



CONNECTION OF TWO TUBES WITH HARRISON FITTINGS



CONNECTION OF A TUBE WITH HARRISON FITTINGS

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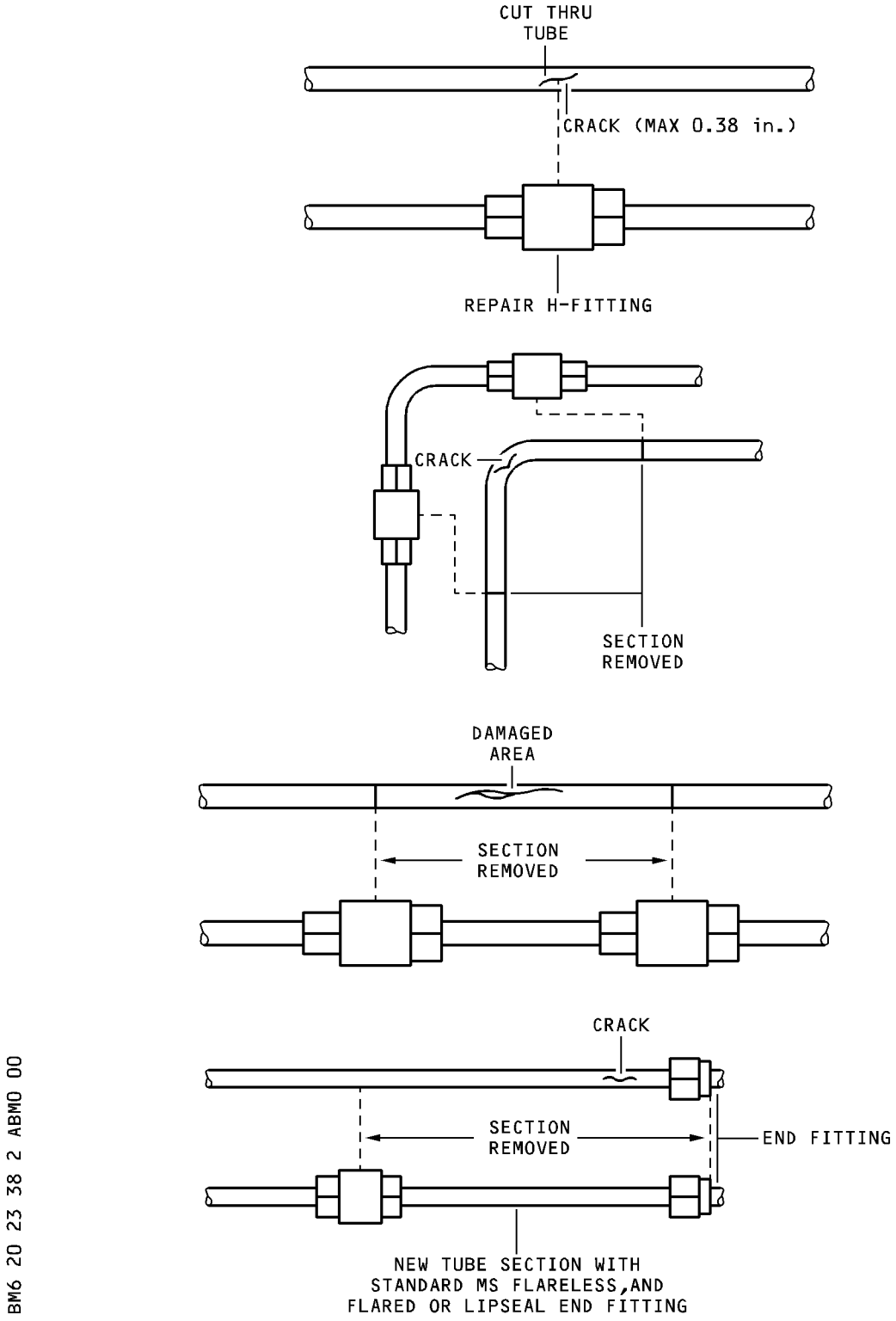
Connection of a (two) Tube(s) with Fittings
Figure 201



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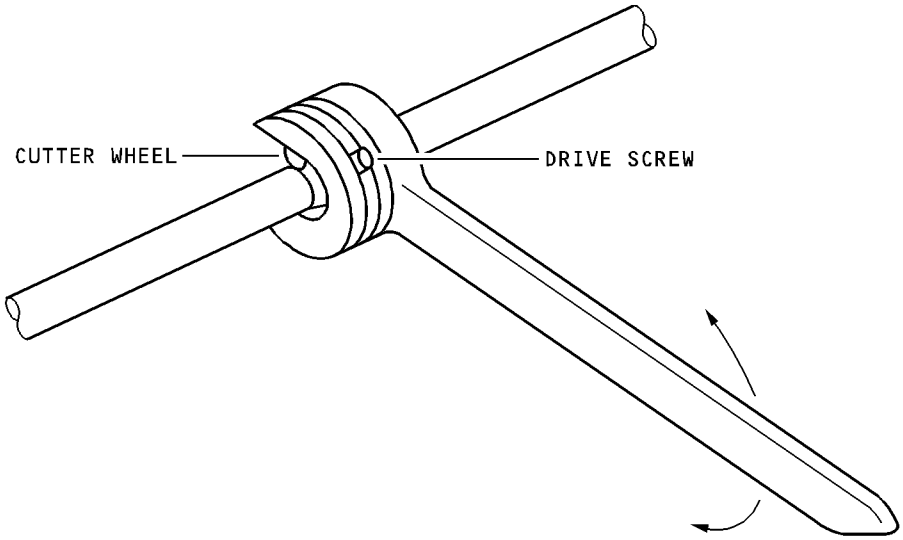
Usual Repair Procedure
Figure 202



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Chipless Cutter
Figure 203

4. Repair of the Tube Assembly Using HARRISON Fittings to be Carried out in the Workshop

A. Equipment and Materials

ITEM	DESIGNATION
A.	Blanking Caps
B.	Brush
C.	Chipless Cutter
D.	Clean Cloth
E.	Container
F.	Deburring Tool
G.	Marking Pen D10058
H.	Marking Tool DLT5302-031-01
J.	Stem Assembly
K.	Swaging tools
L.	Grade 240 Emery Cloth
M.	Torque Wrench : Range 0.20 to3.060 m. daN (2.00 to26.00 lbf.ft.)
N.	Warning Notice
P. Material No. 03-001	Oils (Ref. 20-31-00)
R. Material No. 04-012	Common Greases (Ref. 20-31-00)
S. Material No. 08-009	Bonding and Adhesive Compounds (Ref. 20-31-00)
T. Material No. 08-024	Bonding and Adhesive Compounds (Ref. 20-31-00)
U. Material No. 11-003	Cleaning Agents (Ref. 20-31-00)

R B. Procedure

CAUTION : ONLY PERSONNEL FAMILIAR WITH STAINLESS STEEL TUBE REPAIR SHOULD DO THE FOLLOWING PROCEDURE.

CAUTION : USE THIS APPROVED PROCEDURE TO REPAIR TUBES MADE OF 21-6-9 CORROSION RESISTANT STEEL.

CAUTION : THIS REPAIR PROCEDURE USES A TUBE EXPANSION SWAGING METHOD WITH AN ELASTOMETRIC EXPANDER.

(1)The use of sleeve and union lets you make a connection that you can disassemble between two tubes or a tube and a system component (Ref. Fig. 201).

(2)To repair a tube with a sleeve and union (Ref. Fig. 204), you must:
- cut the tube with a chipless cutter and remove the damaged section,
- square and de-burr the ends of the tubes,
- install the sleeve nut, the sleeve and the union on the tubes,
- swage the tubes into the sleeve and union,
- connect the ends of the tubes with the sleeve, the nut and the union.

(3)Cut the tube

(a)Remove the damaged parts of the tube and/or the defective ends with the applicable PERMASWAGE chipless cutting tool (Ref. Fig. 203).

(b)Put the chipless cutter in the correct position on the tube.

1 Observe the dimension A between the two tubes (Ref. Fig. 204).

2 Make sure that the length of the straight section of the tube is the minimum necessary for the swaging operation (Ref. Fig. 205).
NOTE : If the damaged section is to large or to near the bend, you can replace the damaged section with a new tube. In this case, you must use two HARRISON fittings.

(c)Tighten the drive screw untill the cutter wheel lightly touches the tube. Then give the drive screw a 1/8 to 1/4 turn.
(d)Turn the ratchet handle through the ark of clearance until it turns loosely.
(e)Repeat steps (b) through to (d) to cut through the tube.
(f)Cut the tube slowly and smoothly to make sure that the end of the tube does not change shape.
NOTE : Lubricate the ratchet,the rollers and the cutting wheel regularly with OILS (Mat. No. 03-001)
(g)Carefully square, deburr and champfer the ends of the tubes internally and externally, using a deburring tool (Ref. Fig. 206, 207, 208).

(4)Clean the Tube

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

WARNING : WEAR PROTECTIVE GOGGLES WHEN USING COMPRESSED AIR.
DEBRIS AND/OR HIGH PRESSURE AIR CAN DAMAGE YOUR EYES.
DO NOT POINT COMPRESSED AIR AT YOUR SKIN AS THE AIRSTREAM CAN CAUSE CUTS.
GET MEDICAL HELP IF NECESSARY.

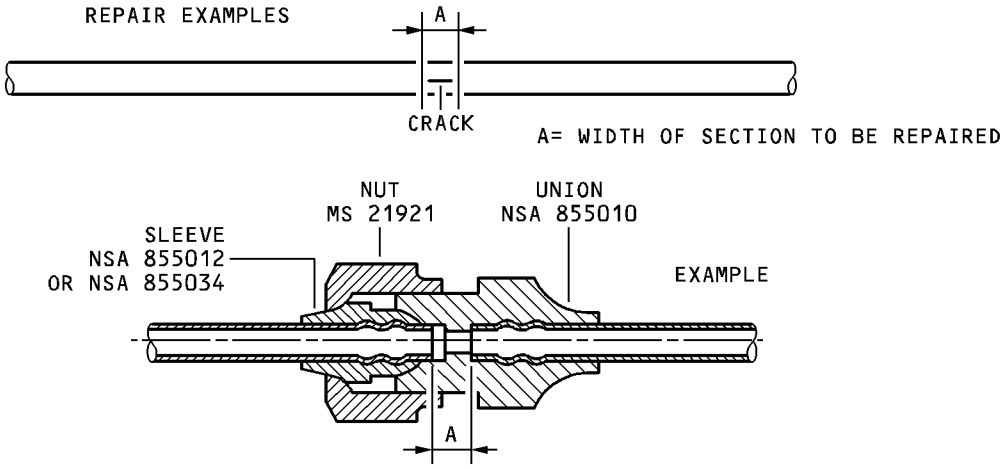
(a)Carefully clean the tube with CLEANING AGENTS (Mat. No. 11-003).
(b)Blow air through the tube to remove all swarf and other foreign materials.

R C. Preparation of the Swage Tools

CAUTION : YOU CAN USE THE MANUAL OR THE AUTOMATIC POWER EQUIPMENT WHEN YOU SWAGE.
MAKE SURE THAT EACH PRESSURE GAGE USED IN THIS PROCEDURE IS CALIBRATED. IF NECESSARY, USE A MASTER GAGE TO CALIBRATE THE PRESSURE GAGE.

CAUTION : REPLACE THE TOOL COMPONENTS AS SOON AS THEY SHOW SIGNS OF WEAR.

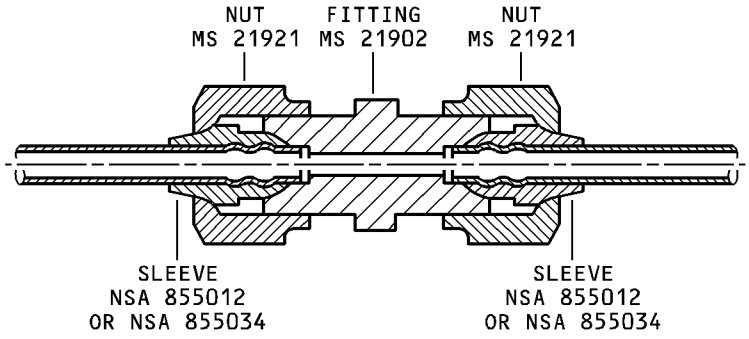
(1)Choose the components of the internal tools to swage the tubes on the sleeve and the union:
- use the applicable drawbar, expander, split back-up washers, tapered back-up ring and thrust bush. (Ref. Fig. 209):
NOTE : For corrosion-resistant steel tube with a dia. of 1/2", 3/8"



THE DIMENSION A IS STATED IN THIS CHART:

TUBE DIA		DIMENSION A	
in.	mm	mm	in.
3/8"	9.52	2.9	0.11
1/2"	12.70	3.5	0.14
3/4"	19.05	4.30	0.17

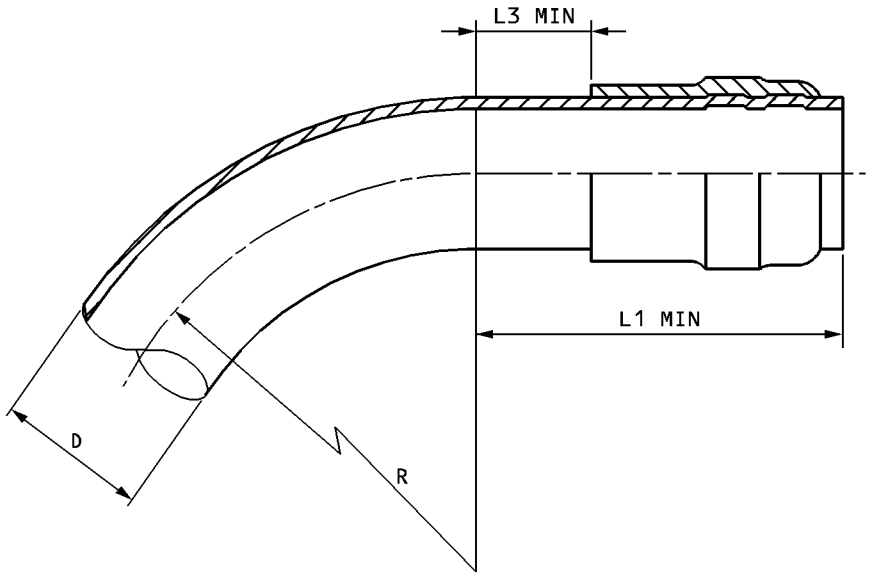
IF THE DAMAGE IS MORE THAN DIMENSION A, YOU CAN USE THIS INSTALLATION:



BM6 20 23 38 2 ADMO 00

Repair of the Tube with **HARRISON** Fittings
Figure 204

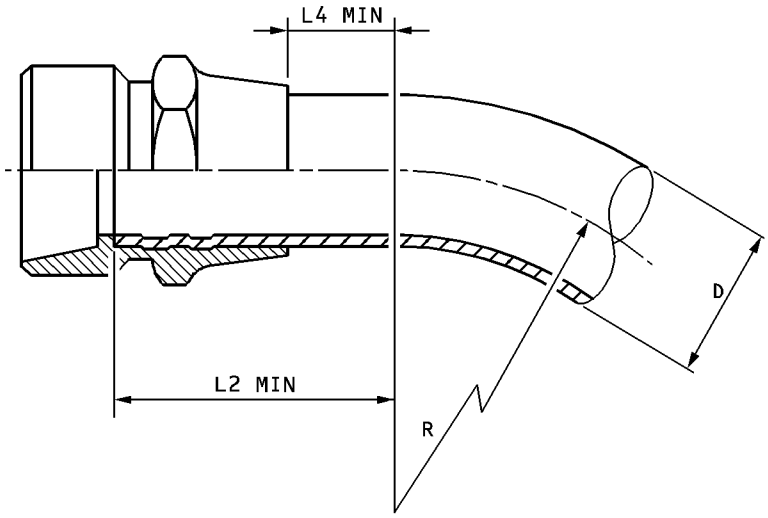
SLEEVE 35055



L= MINIMUM LENGTH OF STRAIGHT TUBE BEFORE SWAGING.

D= TUBE DIA

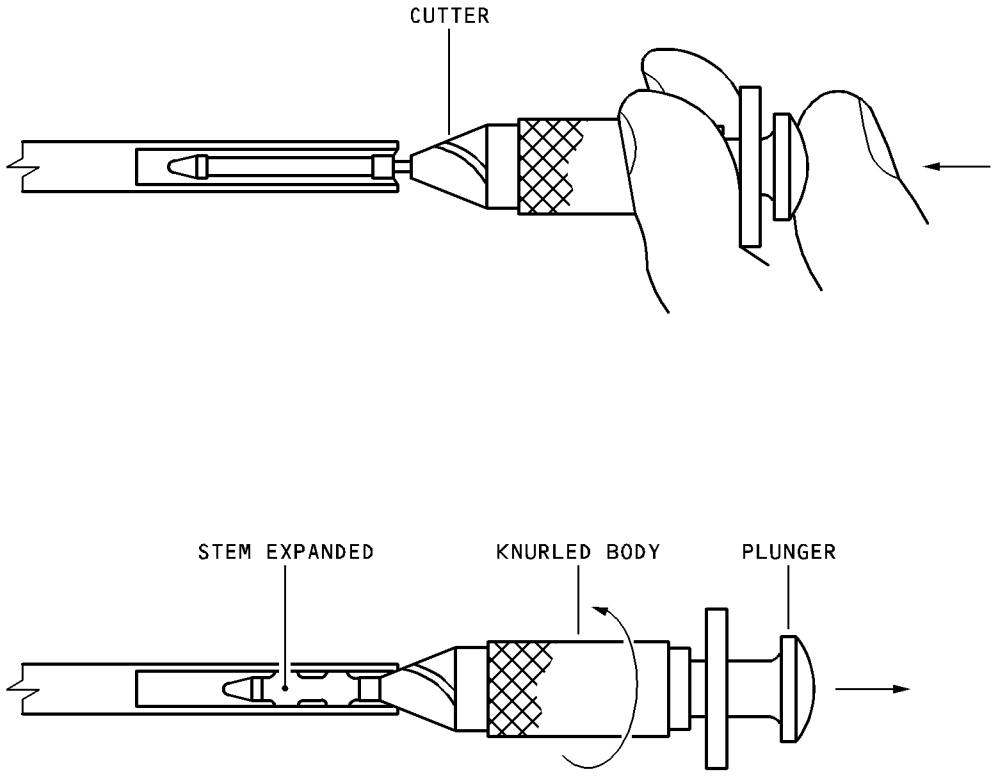
UNION 35066



BM6 20 23 38 2 AEMO 00

TUBE DIA		L1 MIN R=3xD		L2 MIN R=5xD		L3 MIN		L4 MIN	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
3/8	9.52	1.338	34	1.159	32	0.551	14	0.511	13
1/2	12.7	1.49	38	1.49	38	0.629	16	0.511	13
3/4	19.05	1.88	48	1.88	48	0.748	19	0.669	16

Length of the Straight Tube Required for Swaging
Figure 205



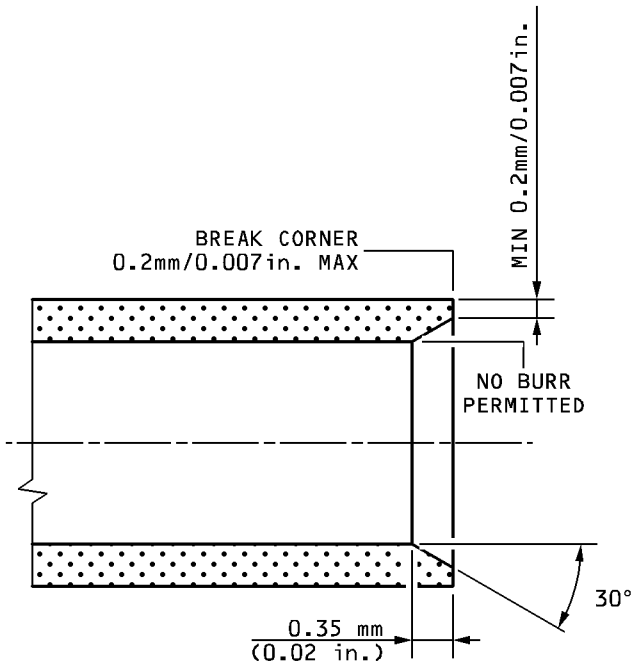
BM6 20 23 38 2 AFM0 00

Deburring Tool Operation
Figure 206

SIZE in.	TUBE WALL RANGE	COMPLETE TOOL	COMPONENT PARTS		OPTIONAL STEM ASSEMBLIES
			BODY ASSEMBLY	STANDARD STEM ASS'Y	
3/8	.016/.035	D9851	D9851-14	D9851-13-06	D9851-13-03
1/2 3/4	.016/.042 .016/.065	D9850	D9850-14	D9850-13-08 D9850-13-12	

BM6 20 23 38 2 AGM0 00

Deburring Tools
Figure 207



BM6 20 23 38 2 AHM0 00

Squaring, Deburring and champfering of the Tube End
Figure 208

and 3/4 two types of tool are available (Ref. Fig. 210).

(2)Install the internal tool components on the drawbar (Ref. Fig. 209) and obey these precautions.

(a)Split-type back-up washers 57. 2. 32.

You must replace these washers when:

- the increase in diameter during each swaging operation becomes permanent.
- it is difficult to install or remove the washers from the tube.

(b)Expander

You must replace the expander as soon as it is difficult to install or remove the tube.

(c)Tapered back-up ring

The cone of the tapered back-up ring 57. 2. 33 must always point to the expander 57. 2. 31.

(d)Thrust bush 57. 2. 17

The shoulder of the thrust bush 57. 2. 17 must point to the drawbar to go into the end of the tube.

(3)Choose the external tool components, applicable to hold the tube and fitting during the swaging. (Ref. Fig. 211):

- two jaws and one die, the jaws and the die must match the O.D. of the tube and the fitting (sleeve and union),
- one die bolster,
- one attach nut,
- one 57. 2. 10 adapter (to attach the drawbar to the swage machine).

NOTE : Make sure that you can adapt the tool components on the swage swage machine (manual or automatic).

(4)Connect the hose between the pump and swager of the swage machine.

NOTE : You can put the swager in the horizontal or vertical position as necessary.

(5)Install the drawbar assembly on the die and on the adapter. Tighten the drawbar on the adapter.

(6)Install the drawbar assembly and the die on the swager. Tighten the drawbar with your hand.

(7)Install the attach nut on the die.

(8)Apply a layer of COMMON GREASE (Mat. No. 04-012) on the expander.

R D. Deburr the Tube.

(1)The internal diameter.

(a)Use the correct deburring tool and stem assembly for:

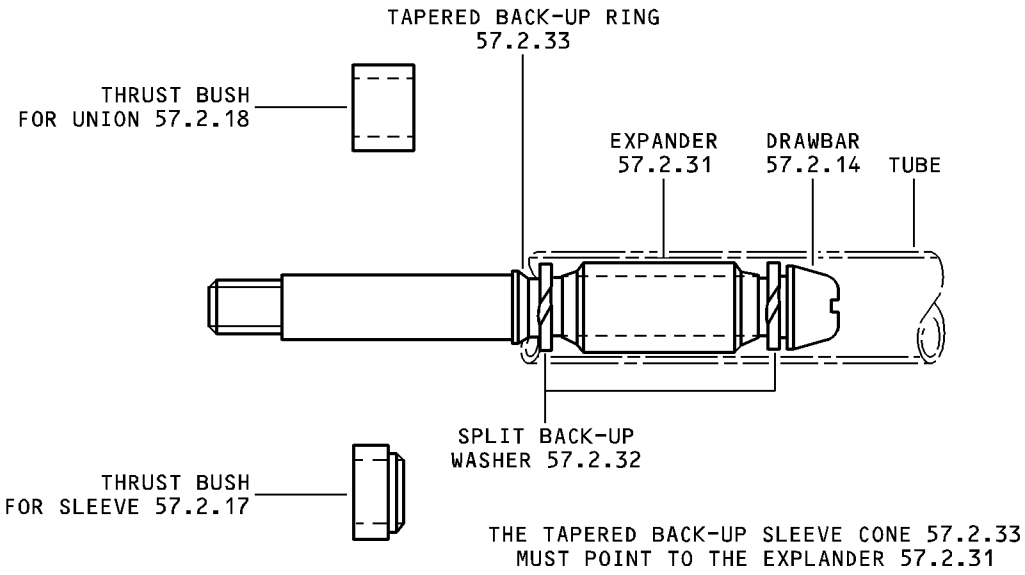
- the diameter of the tube,
- the thickness of the tube wall (Ref. Fig. 207).

(b)Make sure that the deburring tool is clean. Lubricate it with COMMON GREASE (Mat. No. 04-012).

(c)Prepare to deburr the tube:

- hold the tube,
- push in the plunger of the tool,
- put the stem into the end of the tube,
- release the plunger to let the stem become expanded to seal the tube (Ref. Fig. 207).

CORROSION-RESISTANT STEEL 21.6.9 TUBE



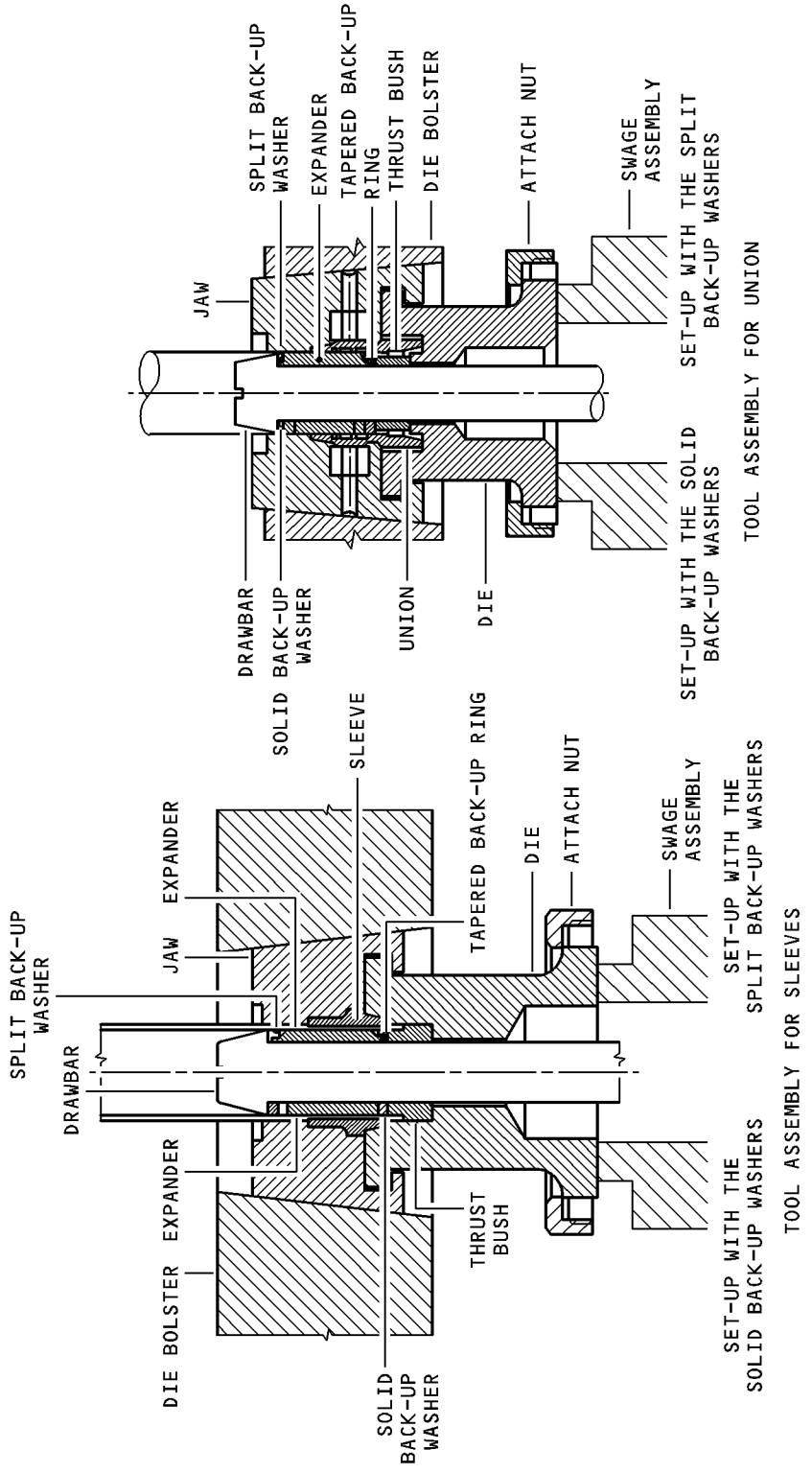
BM6 20 23 38 2 AJM0 00

Internal Swage Tool
Figure 209

FITTING	ITEM	TUBE ØD		TUBE WALL THICKNESS		DRAWBAR	EXPANDER	SPLIT BACK-UP WASHERS	TAPERED BACK-UP RING	THRUST BUSH
		mm	in.	mm	in.					
SLEEVE	03	9.52	3/8	0.51	.020	57.2.14.06	57.2.31.03	57.2.32.03	57.2.33.03	57.2.17.06
	04	12.70	1/2	0.66	.026	57.2.14.08	57.2.31.04	57.2.32.04	57.2.33.04	57.2.17.08
	06	19.05	3/4	0.99	.039	57.2.14.12	57.2.31.06	57.2.32.06	57.2.33.06	57.2.17.12
UNION	13	9.52	3/8	0.51	.020	57.2.14.06	57.2.31.03	57.2.32.03	57.2.33.03	57.2.18.05
	14	12.70	1/2	0.66	.026	57.2.14.08	57.2.31.04	57.2.32.04	57.2.33.04	57.2.18.07
	16	19.05	3/4	0.99	.039	57.2.14.12	57.2.31.06	57.2.32.06	57.2.33.06	57.2.18.11

BM6 20 23 38 2 AKM0 00

Components of the International Swage Tool
Figure 210



BM6 20 23 38 2 ALMO 00

Tool Assembly for Union and Sleeve
Figure 211

(d)Deburr the tube:
- Continue to hold the tube,
- apply light pressure on the cutter and at the same time turn the knurled body clockwise,
- continue to turn the tube until it is fully deburred.

(e)Do not push the plunger in, but :
- carefully and slowly pull the deburring tool out until you can see the first ridge of the stem,
- clean the end and the stem of the tube.

(f)If the end of the tube is not correctly deburred, repeat steps (b) thru to (e).

(2)The external diameter

CAUTION : BURRS ON THE EXTERNAL DIAMETER OF THE TUBE CAN CAUSE DAMAGE TO THE SEALS IN THE FITTINGS. THIS DAMAGE CAN CAUSE EXTERNAL LEAKAGE.

(a)Remove the burrs on the external diameter of the tube with grade 240 emery cloth.

(3)Clean the tube

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

WARNING : WEAR PROTECTIVE GOGGLES WHEN USING COMPRESSED AIR.
DEBRIS AND/OR HIGH PRESSURE AIR CAN DAMAGE YOUR EYES.
DO NOT POINT COMPRESSED AIR AT YOUR SKIN AS THE AIRSTREAM CAN CAUSE CUTS.
GET MEDICAL HELP IF NECESSARY.

(a)Carefully clean the tube with CLEANING AGENTS (Mat. No. 11-003).

(b)Blow air through the tube to remove all swarf and other foreign materials.

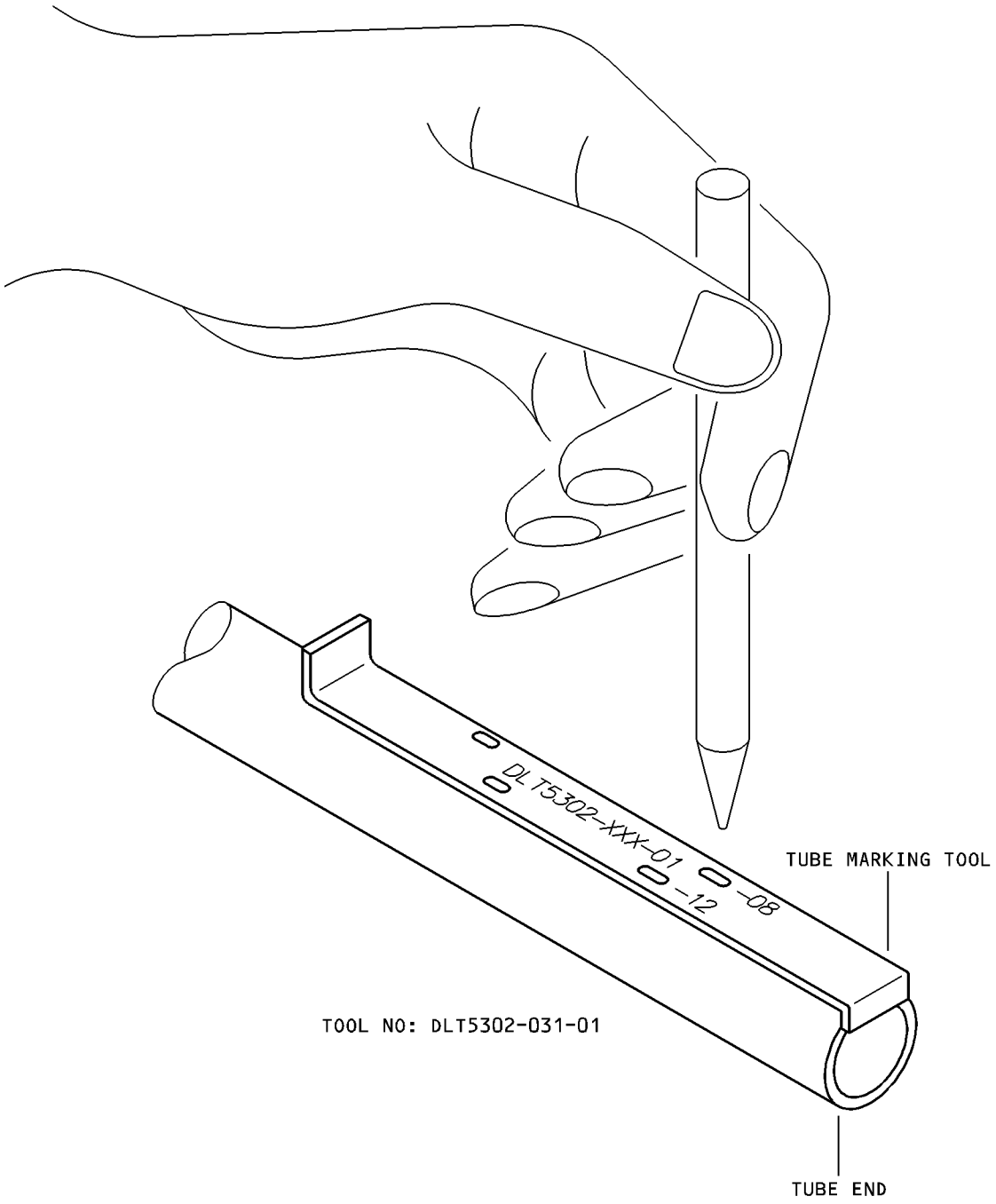
R E. Make the Marks for Tube Insertion (Ref. Fig. 212).

NOTE : These marks give an indication of the depth of the tube in the fitting before and after swaging.

(1)Use the marking tool DLT5302-031-01 with the correct dimensions for the tube you are swaging:
tubes of 1/2", 3/4", 3/8".

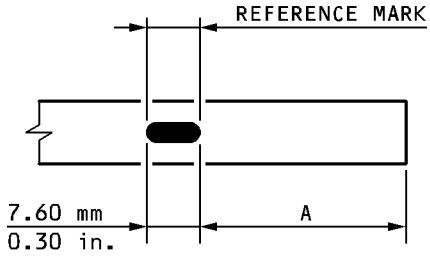
(2)Put the marking tool into position on the tube. The lip of the marking tool must be against the end of the tube. Make a mark on the tube with the marking pen D10058.

NOTE : You can make the marks on the tube without the special tool, but you must keep to the specified high and low limits for the insertion of the end of the tube (Ref. Fig. 213).



BM6 20 23 38 2 AMMO 00

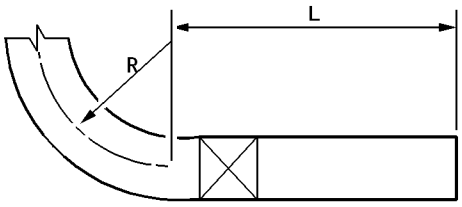
Tube marking Tool
Figure 212



TUBE MARKING TOOL PN DLT 5302-...-01	DIMENSIONS A	TUBE SIZES		DIMENSIONS MINI	
		in.	mm	in.	mm
	-6	3/8	9.52	0.690	17.53
	-8	1/2	12.70	1.193	30.30
	-12	3/4	19.05	1.303	33.10

FOR SWAGING ON A STRAIGHT TUBE SECTION

NOTE: A= REFERENCE NUMBER FOR REFERENCE MARK ON TUBE MARKING TOOL



L:MINIMUM STRAIGHT TUBE LENGTH FOR SWAGING

TUBE SIZES		DIMENSIONS L	
in.	mm	in.	mm
3/8	9.52	1.11	28.3
1/2	12.70	1.62	41.1
3/4	19.05	1.73	43.9

FOR SWAGING NEAR A BEND

BM6 20 23 38 2 ANM0 00

Tube Marking Operation
Figure 213

R F. Installation of the Sleeve and Union on the Tube

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

(1)Apply a layer of COMMON GREASE (Mat. No. 04-012) in the tube end to be swaged.
NOTE : Put the sleeve nut in position on the tube before you install the sleeve.
(2)Bond the Sleeve or the Union on the Tube.
(a)Clean the external surface ofthe tube end with CLEANING AGENTS (Mat. No. 11-003).
(b)Application of the activator.
1 Mask the tube ends to prevent contamination.
2 Apply BONDING AND ADHESIVE COMPOUNDS (Mat. No. 08-009) with a brush or if it is supplied in an aerosol can then spray the area to be swaged.
3 Apply BONDING AND ADHESIVE COMPOUNDS (Mat. No. 08-009) to the internal side of the union that you must swage.
4 Remove all unwanted adhesive.
5 Wait for about 10 minutes.
(c)Apply BONDING AND ADHESIVE COMPOUNDS (Mat. No. 08-024) to the end of the tube to be swaged and make sure that it does not go into the tube.
NOTE : Apply sufficient material to the surfaces to be sealed.
(d)Use force to install the union on the tube and turn the tube.
(e)Apply an equal layer of BONDING AND ADHESIVE COMPOUNDS (Mat. No. 08-024).
(f)Remove all unwanted material after the union is fully installed on the tube.
NOTE : Swage the tube before the bonding and adhesive compounds are dry.

R G. Swage the Tube

(1)Put the tube assembly with the sleeve (or the union) on the drawbar and the die. Fully push the tube and sleeve (or the union) into the swage tool (Ref. Fig. 211).
(2)Install the two jaws on the die and the tube assembly.
(3)Lock the attachment nut.
(4)Tighten the two nuts and make sure that the threads do not cross.
TORQUE the nuts to 3 m. daN (22.12 lbf.ft.).
(5)Tighten the valve installed on the right hand side of the gage.
(6)Slowly operate the pump until you obtain the specified pressure.
(Ref. Fig. 214)
(7)Loosen the valve installed on the right hand side of the gage.
(8)Remove the tube from the swage tool.

HAND SWAGER MODEL 5175 AND 5720-SWAGING PRESSURE CHART					
FOR 21-6-9 CORROSION-RESISTANT STEEL TUBES WITH SLEEVES NSA 855012 VN XX OR UNIONS NSA 855010 PN XX					
TUBE DIA		TUBE WALL THICKNESS		SWAGING PRESSURE ±5%	
mm	in.	mm	in.	GAGE READING 5175	GAGE READING 5720
9.52	3/8	0.51	0.020	1200	
12.70	1/2	0.66	0.026	1950	
19.05	3/4	0.99	0.039		1430

HAND SWAGER MODEL 5175 AND 5720-SWAGING PRESSURE CHART					
FOR 21-6-9 CORROSION-RESISTANT STEEL TUBES WITH SLEEVES NSA 855034 - XX					
TUBE DIA		TUBE WALL THICKNESS		SWAGING PRESSURE ±5%	
mm	in.	mm	in.	GAGE READING 5175	GAGE READING 5720
9.52	3/8	0.51	0.020	1150	
12.70	1/2	0.66	0.026	2000	
19.05	3/4	0.99	0.039		1600

BM6 20 23 38 2 APM0 00

Swaging Pressure with Hand Swager Models 5175 and 5720 for the NSA 855021 Sleeve and/or the NSA 855010 Union
Figure 214

NOTE : Wait for 24 hours before you do the pressure test or degrease the tube.

(9)Clean the tube.

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

(a)Carefully clean the tube with CLEANING AGENTS (MAT. No. 11-003).

R H. Inspection of the Swage

(1)Make sure that the swage obeys the Dimension acceptance criteria. (Ref. Fig. 215, 216, 217)

(a)You must reject the swage if:
- the diameters D1, D2 or D3 are higher than the maximum tolerance,
- the wave deformations A2 are higher than the maximum tolerance,
- the dimension B is lower than the minimun tolerance.

(b)You can re-swage the tube if:
- the wave deformations A or the diameters D1, D2 or D3 are lower than the minimum tolerance.

NOTE : To re-swage, you can increase the maximum swaging pressure to plus 10 %.

(c)You can remove material from the end of the tube if:
- the tube is too long and you cannot install it.

NOTE : Dimension B has a minimum length of +0.5 mm -0.0 mm (0.0019 in. -0.0000 in.).

(2)If there are marks on the tube, measure the depth of these marks.

NOTE : You can possibly see two types of marks on the tube after swaging:
- circular marks behind the sleeve thimble-end,
- contact marks, from the jaw of the die.

(a)Make sure that the circular marks are no deeper than 0.05 mm (0.0019 in.).

(b)Make sure that the contact marks are not more than 10 % of the wall thickness.

R I. Pressure Test of the Tube

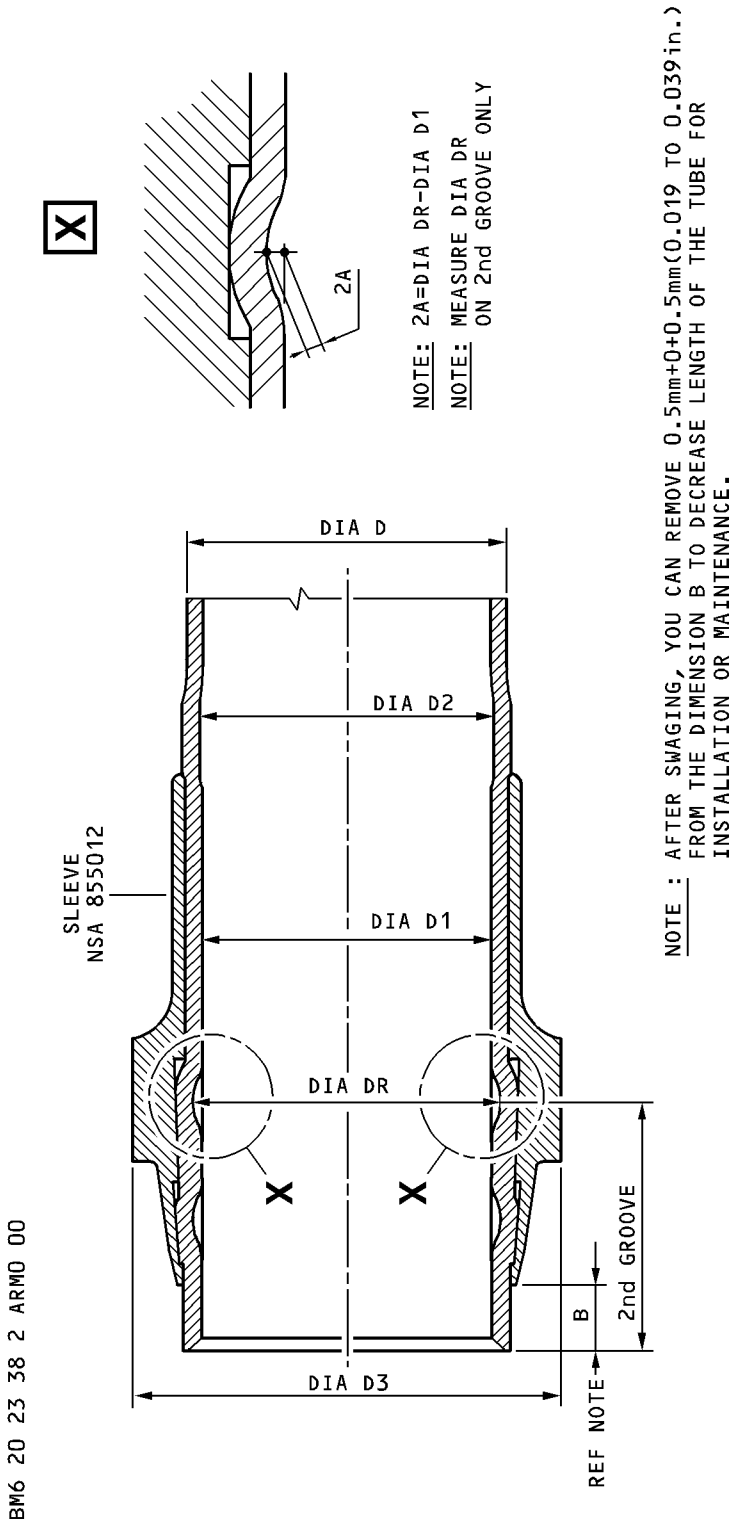
(1)Connect the HARRISON sleeve and union of the tube and TORQUE it to the normal value (Ref. Fig. 218).

(2)Pressurize the tube to the operational pressure.

(3)If there is a leakage, slowly and contiuously increase the TORQUE value, up to the maximum authorized (maximum test value) until you stop the leak.

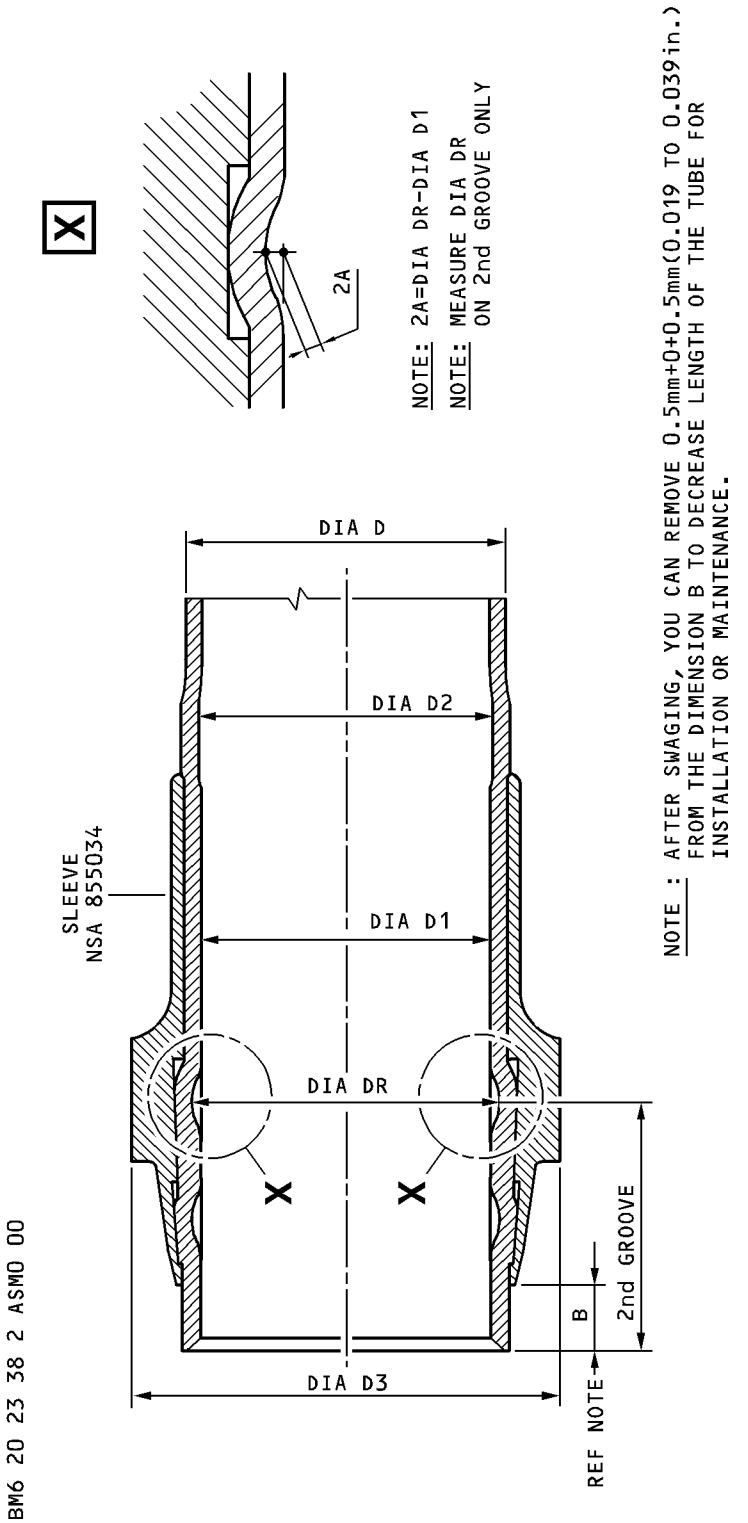
(4)Make sure there is no leakage.

NOTE : Leakage is not permitted.



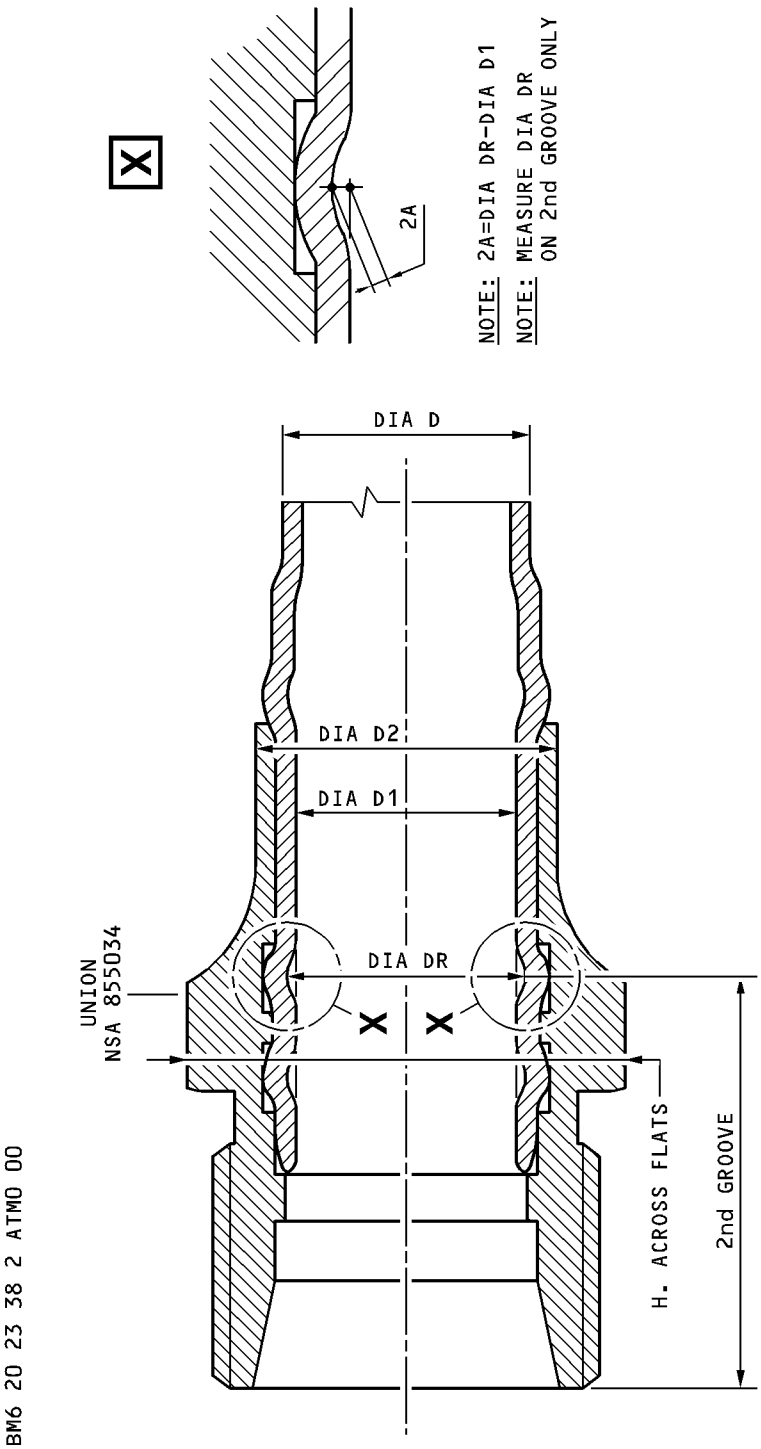
TUBE DIA D		B			WAVE DEFORMATION 2A				DIA D1				DIA D2 MAX		DIA D3 MAX	
		+0 -0.25		+0 -0.01	MIN		MAX		MIN		MAX					
mm	in.	mm		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
9.52	3/8	2.49		.098	0.30	0.012	0.58	0.023	9.68	.381	9.78	.385	10.74	.423	12.52	.493
12.70	1/2	2.54		.100	0.30	0.012	0.074	0.029	12.9	.508	13	.511	13.97	.550	17.09	.673
19.05	3/4	3.56		.140	0.43	0.017	0.074	0.029	19.3	.757	19.4	.761	20.87	.822	24.48	.964

Dimension Acceptance Criteria for the NSA 855012 Sleeve
Figure 215



TUBE DIA D		B		WAVE DEFORMATION 2A				DIA D1				DIA D2 MAX		DIA D3 MAX	
		+0 -0.25	+0 -0.01	MIN		MAX		MIN		MAX					
mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
9.52	3/8	2.49	.098	0.50	.020	0.81	0.32	9.68	.381	9.78	.385	10.74	.423	12.52	.493
12.70	1/2	2.54	.100	0.51	.020	0.81	0.32	12.88	.508	12.98	.511	13.97	.550	17.09	.673
19.05	3/4	3.56	.140	0.66	.026	0.96	0.38	19.23	.757	19.33	.761	20.87	.822	24.48	.964

Dimension Acceptance Criteria for the NSA 855034 Sleeve
Figure 216



TUBE DIA D		WAVE DEFORMATION 2A				DIA D1				DIA D2		H. ACROSS FLATS	
		MIN		MAX		MIN		MAX					
mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
9.52	3/8	0.30	.012	0.58	.023	9.68	.381	9.98	.393	11.30	.445	14.35	.565
12.70	1/2	0.30	.012	0.74	.029	1288	.508	13.18	.519	14.84	.584	19.10	.752
19.05	3/4	0.43	.017	0.74	.029	19.23	.757	19.53	.769	21.92	.863	28.02	1.064

Dimension Acceptance Criteria for the NSA 855034 Union
Figure 217

TUBE O.D. in.	TUBE O.D. mm	TUBES IN 21.6.9	
		NORMAL TEST VALUES m. daN lbf. in.	MAX. AUTHORIZED m. daN lbf. in.
3/8	9.52	0.90/80	2.90/257
1/2	12.70	1.70/151	5.40/479
3/4	19.05	2.80/226	9.70/860

YOU MUST DO THE TESTS WITH THE MINIMUM VALUES THAT THE CHART GIVES.

IF THERE IS LEAKAGE, YOU CAN SLOWLY AND CONTINUOUSLY INCREASE TORQUE VALUE TO THE MAXIMUM.

THE MAXIMUM VALUES SPECIFIED FOR PRESSURE ARE THE SAME AS THE MINIMUM TORQUE VALUES ON THE AIRCRAFT.

BM6 20 23 38 2 AUM0 00

Torque Value for the Pressure Test
Figure 218

5. Repair of the Tube Assembly Using the PERMASWAGE Repair Procedur to be Carried out in the Aircraft

A. Equipment and Materials

ITEM	DESIGNATION
A.	Blanking Caps
B.	Chipless Cutter
C.	Clean Cloth
D.	Container
E.	Deburring Tool
F.	Grade 240 Eemery Cloth
G.	Marking Pen D10058
H.	Marking Tool DLT5302-031-01
J.	PERMASWAGE Repair Kit DLT series or D12000 series tools (vendor code F6087)
K.	Stem Assembly
L.	Warning Notice
M. Material No. 03-001	Oils (Ref. 20-31-00)
N. Material No. 04-012	Common Greases (Ref. 20-31-00)
P. Material No. 11-003	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 12-23-38, P. Block 1	Servicing
- 24-41-00, P. Block 301	AC External Power Control

B. Procedure

(1)Job Set-up

(a)Energize the ground service network (Ref. 24-41-00, P. Block 301).

(b)Drain the potable water system (Ref. 12-24-38, P. Block 1).

(c)Depressurize the potable water system (38-40-00, P. Block 301).

(d)Put a warning notice in position to tell the personnel not to fill or pressurize the potable water system.

(2)Repair the tube assembly

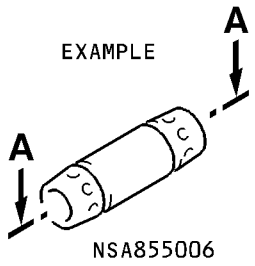
WARNING : MAKE SURE THAT ALL EQUIPMENT USED FOR THIS PROCEDURE IS CLEAN AND APPROVED FOR THE POTABLE WATER SYSTEM. IF NOT IT CAN CAUSE CONTAMINATION OF THE POTABLE WATER SYSTEM.

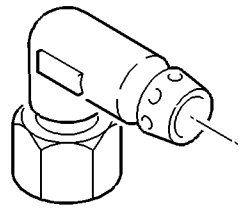
WARNING : MAKE SURE THAT THE POTABLE WATER SYSTEM IS DEPRESSURIZED. A PRESSURIZED SYSTEM CAN CAUSE INJURY TO PERSONS WORKING ON THE SYSTEM.

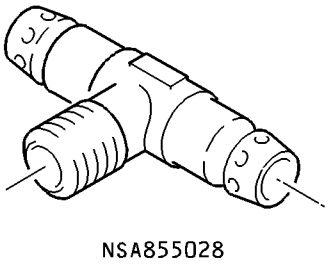
NOTE : Use this approved procedure to repair tubes made of 21.6.9 corrosion resistant steel (Ref. Fig. 219).

NOTE : You can use the PERMASWAGE repair procedure to repair the tubes installed with HARRISON fittings.

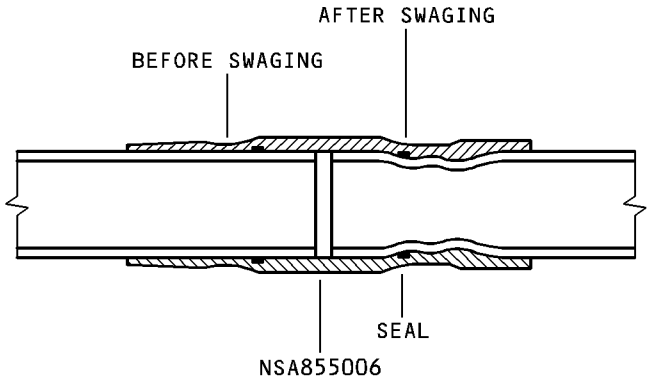
There are two types of PERMASWAGE fittings:
- permanent,
- separable (that can be removed).







SECTION
A-A



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Swage Principle
Figure 219

The table below gives the standards for the swaged fittings that are available.

PERMANENT FITTINGS	SEPARABLE FITTINGS		SLEEVE AND NUT
ABS0335	ABS0450	ASNA3757	ASN3758
ABS0477	ABS0464	ASNA3765	NSA855022
ABS0566	ABS0534	ASNA3767	NSA855024
ASNA3752	ABS0542	ASNA3768	NSA855027
ASNA3753	ABS0544	NSA855011	NSA855036
ASNA3756	ABS0545	NSA855020	
ASNA3764	ABS0650	NSA855025	
ASNA3766	ABS0658	NSA855026	
ASNA3772	ABS0669	NSA855030	
NSA855006 and 008	ABS0675	NSA855032	
	ABS0711	NSA855033	
		NSA855037	

You can swage **PERMASWAGE** fittings on the aircraft.

NOTE : The separable fittings have **MS33541** or **MS33515** threaded end threaded end or a sleeve and nut.

(a)Remove the the potable water de-icing elements as necessary.

(b)Put a container below the potable water line to collect any unwanted water.

(c)Cut the tube.

NOTE : You must use the applicable **PERMASWAGE** repair kit **DLT** series or **D12000** series tools (vendor code **F6087**) **D12000** series is the previous generation (Ref. Fig. 220, 221).

1 Remove the damaged parts of the tube or the defective ends with the applicable **PERMASWAGE** chipless cutting tool:
- **D12531-001**, tubes 1/2", 3/4" and 3/8".

2 Put the tubing cutter into the correct position on the tube (Ref. Fig. 203).

3 Tighten the drive screw untill the cutter wheel lighty touches the tube. Then give the drive screw a 1/8 to 1/4 turn.

4 Turn the ratchet handle through the ark of clearance until it turns loosely.

5 Repeat steps (2) through to (4) to cut through the tube.

6 Cut the tube slowly and smoothly to make sure that the end of the tube does not change its shape.

NOTE : Lubricate the ratchet,the rollers and the cutting wheel regularly with **OILS** (Mat. No. 03-001).

(d)Deburr the tube (Ref. Fig. 206, 207, 208).

1 The internal diameter

a Use the deburring tool and the stem assembly that are correct for:
- the diameter of the tube,
- the thickness of the tube wall.

b Make sure that the deburring tool is clean. Lubricate it with **COMMON GREASE** (Mat. No. 04-012).

c Prepare to deburr the tube:

TUBE SIZES 1/16in.	MATERIAL INCLUDED IN KITS (DLT SERIE)						
	HEAD ASSEMBLIES	POWER UNITS	CUTTING TOOLS	DEBURRING TOOLS		INSPECTION GAGES	MARKING TOOLS
				BODY	STEMS		
-6	DLT10PSHA3006	DLT10MAPW0000	D12530-001	D9851-14	D9851-13-06	D12-9892-06	DLT5302-013-01
-8	DLT20PSHA3008	DLT20MAPW0000	D12531-001	D9850-14	D9850-13-08	D12-9892-08	DLT5302-031-01
-12	DLT30PSHA3012	DLT30MAPW0000	D12531-001	D9850-14	D9850-13-12	D12-9892-12	DLT5302-031-01

NOTE:A D10058 MARKING PEN IS INCLUDED IN ALL KITS

TUBE SIZES	KIT PART NUMBER
6	DLT10PSKT3002
8	DLT20PSKT3000
12	DLT30PSKT3000

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PERMASWAGE - Series DLT Repair Kit
Figure 220

TUBE SIZES 1/16in.	MATERIAL INCLUDED IN KITS (D12000 SERIE)									INSPECTION GAGES	MARKING TOOLS
	HEAD ASSEMBLIES		POWER UNITS		CUTTING TOOLS	DEBURRING TOOLS					
	CODE	PART NUMBER	CODE	PART NUMBER		BODY	STEMS				
-6	02	D12206-56	01	D12550-013	D12530-001	D9851-14	D9851-13-06			D12-9892-06	DLT5302-013-01
-8	07	D12208-56	02	D12550-022	D12531-001	D9850-14	D9850-13-08			D12-9892-08	DLT5302-031-01
-12	08	D12225-012-056	11A00	D12550-031	D12531-001	D9850-14	D9850-13-12			D12-9892-12	DLT5302-031-01

NOTE:A D10058 MARKING PEN IS INCLUDED IN ALL KITS

REPAIR KIT DESIGNATION APPLICABLE TO TUBE SIZES:

D12102C XX-XX
- XX — CODE NUMBER OF THE POWER UNIT
- XX — CODE NUMBER OF THE HEAD ASSEMBLIES
- D12102C — BASIC KIT NUMBER

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PERMASWAGE - Series D12000 Repair Kit
Figure 221

- hold the tube,
- push in the plunger of the tool,
- put the stem into the end of the tube,
- release the plunger and let the stem expand to seal the tube.

d Deburr the tube:
- continue to hold the tube,
- apply light pressure on the cutter and at the same time turn
- the knurled body clockwise,
- continue until the tube is deburred.

e Do not push the plunger in, but:
- carefully and slowly pull the deburring tool from the tube untill you can see the first ridge of the stem,
- clean the end of the tube and the stem.

f If the end of the tube is not correctly deburred:
- repeat steps (c) to (e).

g Carefully clean the tube with CLEANING AGENTS (Mat. No. 11-003) and dry it immediately.

h Blow air through the tube to remove all swarf and other foreign matter.

2 The external diameter

CAUTION : BURRS ON THE EXTERNAL DIAMETER OF THE TUBE CAN CAUSE DAMAGE TO THE SEALS IN THE FITTINGS. THIS DAMAGE CAN CAUSE EXTERNAL LEAKAGE.

a Remove the burrs on the external diameter of the tube with grade 240 emery cloth.

(e)Clean the tube

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

WARNING : WEAR PROTECTIVE GOGGLES WHEN USING COMPRESSED AIR.
DEBRIS AND/OR HIGH PRESSURE AIR CAN DAMAGE YOUR EYES.
DO NOT POINT COMPRESSED AIR AT YOUR SKIN AS THE AIRSTREAM CAN CAUSE CUTS.
GET MEDICAL HELP IF NECESSARY.

1 Carefully clean the tube with CLEANING AGENTS (Mat. No. 11-003) and dry it immediately.

2 Blow air through the tube to remove all swarf and other foreign matter.

(f)Make the marks for tube insertion (Ref. Fig. 212).

NOTE : These marks give an indication of the depth of the tube in the fitting before and after swaging.

1 Use marking tool DLT5302-031-01 with the correct dimensions for the tube that you must swage:

DLT5302-031-01, for tubes of 1/2", 3/4" and 3/8".

2 Put the marking tool into position on the tube. The lip of the marking tool must be against the end of the tube. Make a mark on the tube with the marking pen D10058.

NOTE : You can make the marks on the tube without the special tool. But you must keep to the specified high and low limits for the insertion of the end of the tube (Ref. Fig. 213).

(f)Swage the fitting on the tube (Ref. Fig. 222).

CAUTION : DO NOT CAUSE DAMAGE TO THE SEALS OF THE FITTINGS:
- THE TUBES MUST HAVE NO EXTERNAL BURRS,
- THE TUBES MUST GO FREELY INTO THE FITTINGS,
IF THE TUBE DOES NOT GO FREELY INTO THE FITTING (NOT CIRCULAR OR OUT OF TOLERANCE), DO NOT INSTALL THE FITTING THE SURFACES MUST BE CLEAN AND WITHOUT DAMAGE:
- THE SWAGING AREA MUST HAVE NO DEEP SCRATCHES AND MUST BE CLEAN (NO DUST, PARTICLES OF METAL, ETC).
BEFORE YOU SWAGE CLEAN THE END OF THE TUBE WITH A CLEAN CLOTH.

NOTE : The end of the fitting must be within the area of the reference marks (Ref. Fig. 223).

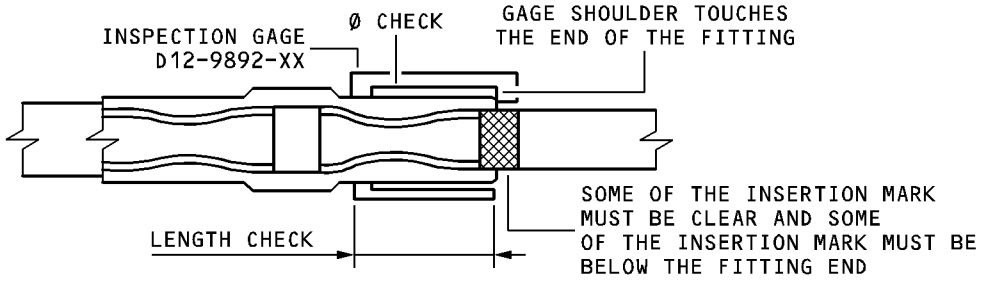
1 Install the fitting on the tube.
2 Use a swage tool assembly and power unit which are correct for the dimensions of the tube (Ref. Fig. 224).
3 Swage with the tool series DLT (Ref. Fig. 225).

WARNING : MAKE SURE THAT ONLY APPROVED PERSONNEL USE THIS TOOL. THIS TOOL OPERATES AT VERY IGH PRESSURES AND CAN BE DANGEROUS.

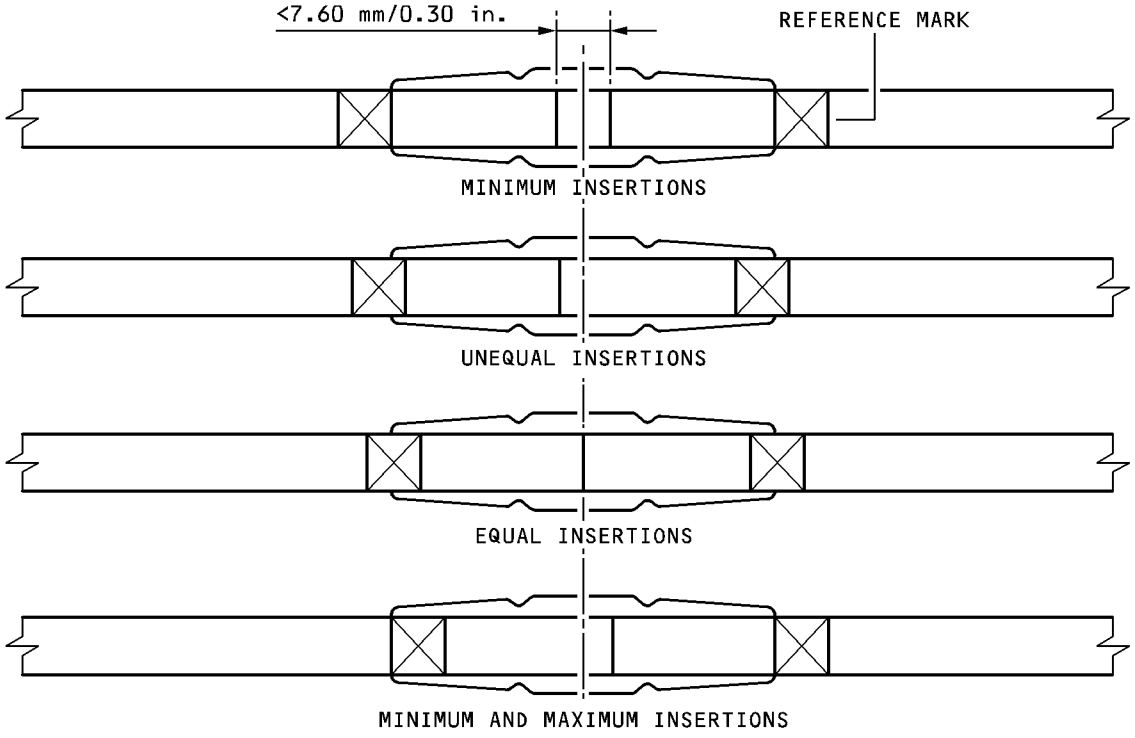
a Push the die block assembly out of the head assembly.
b Make sure that the upper and lower dies have the same serial number.
c Put the lower die block on top of the power unit.
d Connect the power unit to the hydraulic pump.
e Position the head assembly on the fitting and the water tube. Make sure that the bevelled end of the die is towards the center of the fitting.
f Put the knurled surface of the power unit and the head assembly on the same side, and engage the power unit on the head assembly. Make sure that the balls in the lower die block engage with a "click" on the head assembly.
g Move the power unit towards the center of the fitting until the stop plate touches the fitting.
h Make sure that the end of the fitting is on the reference mark (Ref. Fig. 223).
j Apply a hydraulic pressure of 690 +17 -17 bar (1000 +250 -250 psi) to the power unit in order to swage the fitting.
k Release the pressure.
l Remove the power unit and the head assembly.

4 Swage with the tool series D12000 (Ref. Fig. 226)

WARNING : MAKE SURE THAT ONLY APPROVED PERSONNEL USE THIS TOOL. THIS



PERMITTED INSTALLATIONS



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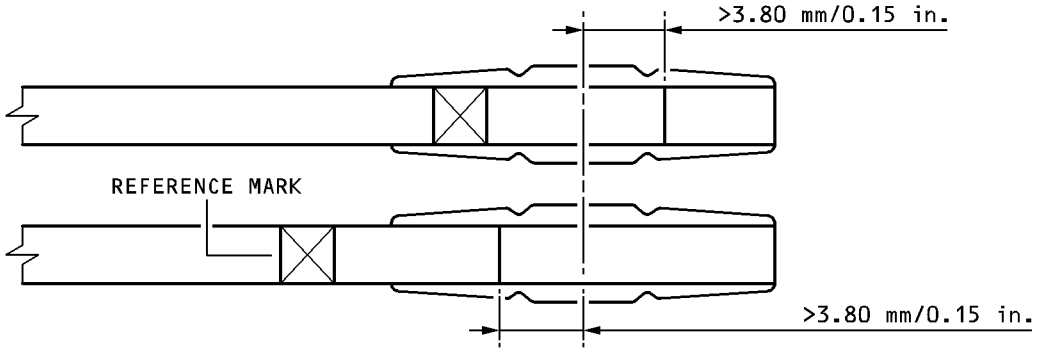

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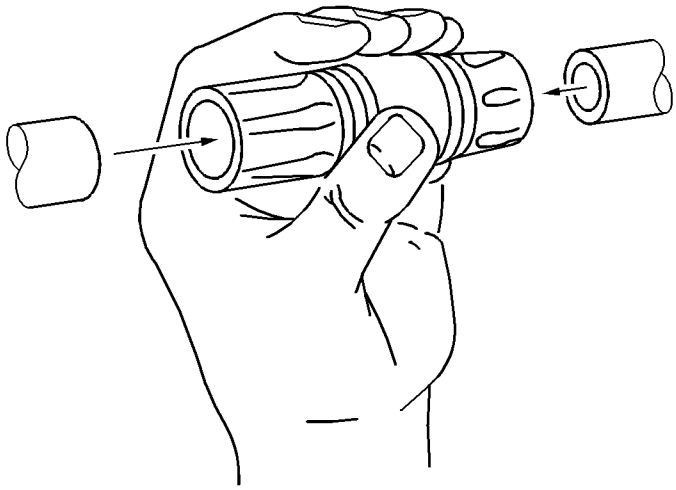
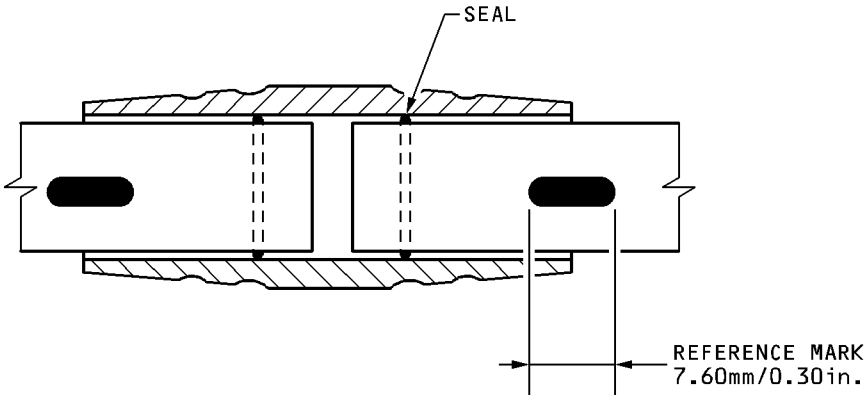
Swage Fitting Installation
Figure 222





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Fitting Installation
Figure 223

DLT SERIE TOOLS:

TUBE SIZE in.	SWAGE HEAD ASSEMBLY	POWER UNIT
3/8	DLT10PSHA3006	DLT10MAPW0000
1/2	DLT20PSHA3008	DLT20MAPW0000
3/4	DLT30PSHA3012	DLT30MAPW0000

D12000 SERIE TOOLS:

TUBE SIZE in.	SWAGE TOOL ASSEMBLY	COMPONENT PARTS OF THE SWAGE TOOL ASSEMBLY	
		SWAGE HEAD ASSEMBLY	POWER UNIT
3/8	D12206	D12206-56	D12550-013
1/2	D12208	D12208-56	D12550-022
3/4	D12225-012	D12225-012-56	D12550-031

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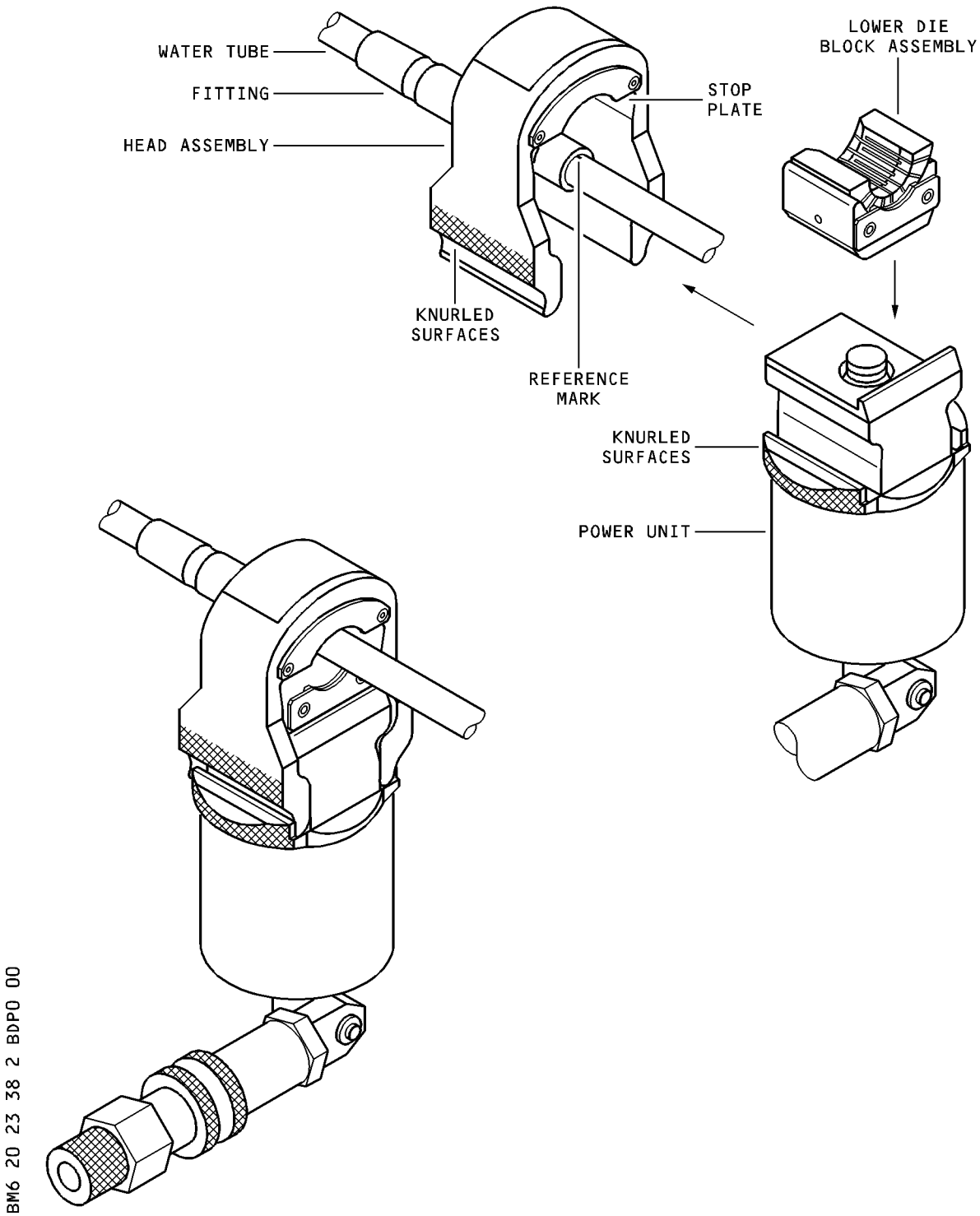
Swage Tools
Figure 224



Swage Tool Installation (Series DLT)
Figure 225

TOOL OPERATES AT VERY HIGH PRESSURES AND CAN BE DANGEROUS.

a Make sure that you install the dies correctly in the yoke and in the die holder assembly. They must be installed with the tapered end of the dies on the black side of the yoke and die holder assembly.

b Move the yoke into position on top of the fitting:
- the silver side of the yoke assembly must be nearest to the end of the fitting to be swaged,
- the silver side of the yoke must be aligned with the end of the fitting.

Push the die holder into the yoke assembly:
- the silver faces of the die holder assembly and the yoke must be on the same side,
- the silver side s of the yoke and the die holder must be aligned with the end of the fitting.

c Install the power unit:
- install the square connector of the power unit in the swage head assembly,
- tighten the knurled nut of the power unit with your hand,
- connect the hose and the coupling half-assembly of the hydraulic power supply (D12025-001) to the nipple valve of the power unit.

Make sure that:
- the end of the fitting is within the area of the insertion marks marks on the tube (Ref. Fig. 223).
- the silver sides of the yoke and the die holder are aligned with the end of the fitting.

Carefully move the tool back until the end stops are approximately 0.8 mm (0.0314 in.) from the end of the fitting.

d Make sure that the pressure relief valve of the swaging tool is set to open at 380 +17 -17 bar (5500 +250 -250 psi).
Do not pressurize too high or too low,
- operate the swaging tool with a hydraulic handpump or a Hydraulic power source (push the remote air ON button).

e Keep the swaging tool in position and apply pressure of 380 +17 -17 bar (5500 +250 -250 psi.).

f Release the pressure and remove the swaging tool from the fitting.
NOTE : If the pressure is not released, the dies stay closed and can not be removed.

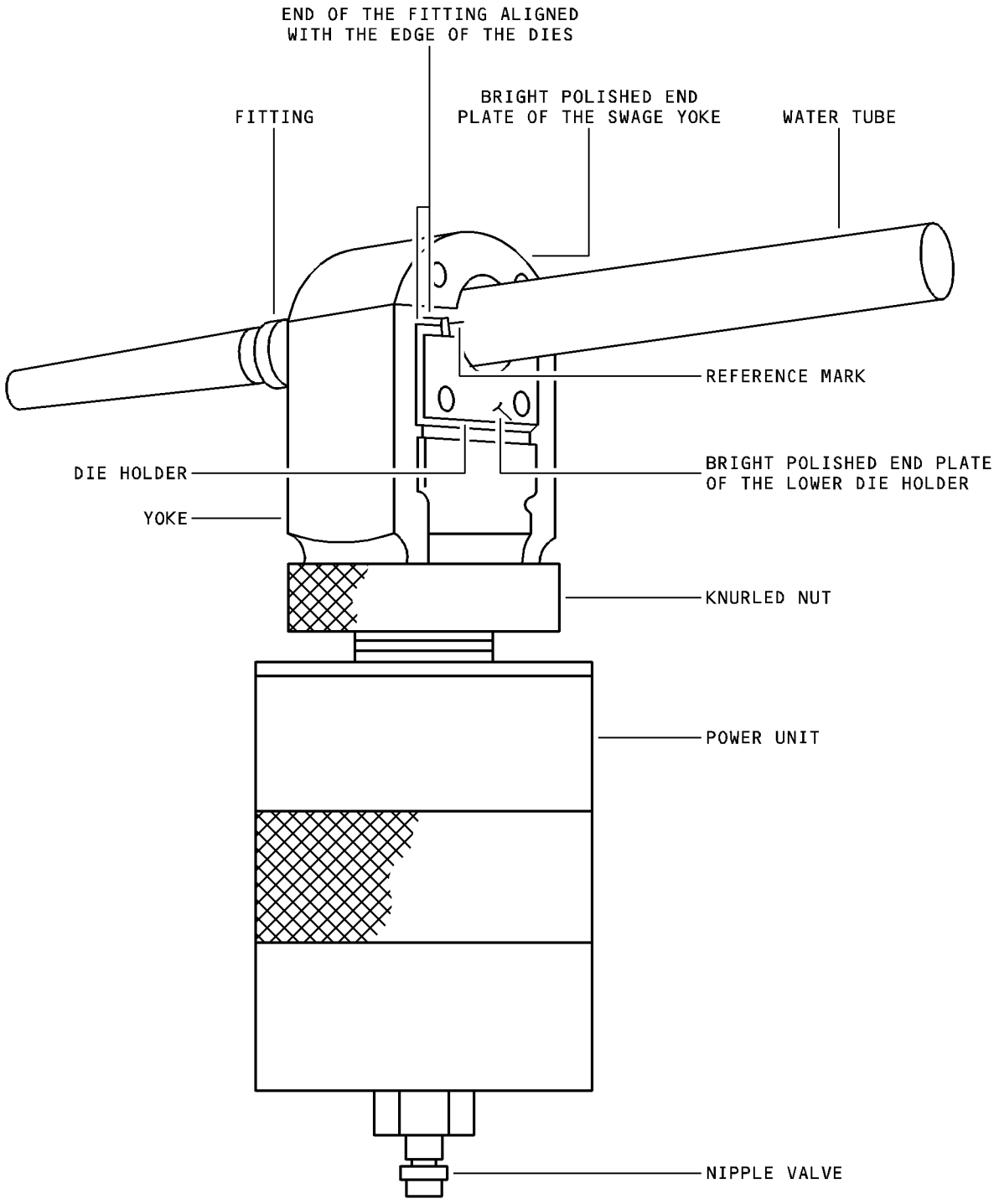
g Loosen the knurled nut and remove power unit, die holder and the yoke assembly.

5 Inspection of the tube joint

a Visually inspect the joint to see if insertion mark is visable.
NOTE : The joint must be rejected if the tube, goes to far into the fitting, or not far enough into the fitting.

b Inspect the joint with the applicable inspection gage (Ref. Fig. 227, 222).
The inspection gage must:
- contain all the segments around the diameter of the fitting,
- touch the end of the fitting with its shoulder,

If the swaging is not correct you can re-swage the joint, but only under certain conditions.



Swage Tool Installation (Series D12000)
Figure 226

NOTE : Make sure that the swaging pressure is correct.
NOTE : For any other malfuntions, contact your PERMASWAGE S. A. supplier.

6 Leak test of the repaired tube
a Remove the warning notice.
b Fill the potable water system with water (Ref. 12-15-38, P.Block 1).
c Pressurize the potable water sysytem (Ref. 38-40-00, P. Block 301).
d Examine the repaired tube for leaks.
e If there is a leakage, slowly and continuously increase the TORQUE value to the maximum authorized (maximum test value) until you stop the leak.
NOTE : Leaks are not allowed.

7 Leak test of the air supply lines.
a Examine the repaired air tubing for leaks.
b If there is a leakage, slowly and continuously increase the TORQUE TORQUE value to the maximum authorized (maximum test value) until you stop the leak.
NOTE : Leaks are not allowed.

C. Close-Up
(1)Make sure that the work area is clean and clear of tools and other items.
(2)Install any removed panels and or doors.
(3)Sterilize the potable water system (Ref. 38-10-00, P. Block 301).
(4)De-energize the ground service network (Ref. 24-41-00, P. Block 301).

TUBE SIZE in.	INSPECTION GAGE
3/8	D12-9892-06
1/2	D12-9892-08
3/4	D12-9892-12

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Inspection Gages
Figure 227

6. Repair of the Tubes with H-Fittings to be Carried out in the Aircraft

A. Equipment and Materials

ITEM	DESIGNATION
A.	Blanking Caps
B.	Chipless Cutter
C.	Container
D.	Clean Cloth
E.	Deburring tool
F.	Warning Notice
G. Material No. 11-003	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 12-15-38, P. Block 1	Replenishing Potable Water
- 12-24-38, P. Block 1	Potable Water System - Draining
- 24-41-00, P. Block 301	AC External Power Control
- 38-10-00, P. Block 301	Sterilization of the potable water system
- 38-40-00, P. Block 301	Air Supply

B. Procedure

(1)Job Set-Up

(a)Energize the ground service network (Ref. 24-41-00, P. Block 301).

(b)Depressurize the potable water system (Ref. 38-40-00, P. Block 301).

(c)Drain potable water system (Ref. 12-24-38, P. Block 1).

(d)Put a warning notice in position to tell personnel not to fill or pressurize the potable water system.

(2)Removal of the Damaged Tube Section

WARNING : MAKE SURE THAT THE EQUIPMENT YOU USE FOR THIS PROCEDURE IS CLEAN AND APPROVED FOR THE POTABLE WATER SYSTEM. IF NOT IT CAN CAUSE CONTAMINATION OF THE POTABLE WATER SYSTEM.

WARNING : MAKE SURE THAT THE POTABLE WATER SYSTEM IS DEPRESSURIZED. A PRESSURIZED SYSTEM CAN CAUSE INJURY TO PERSONS WHEN THEY DO WORK ON IT.

(a)Cut the tube.

1 Remove the damaged parts of the tube or the defective ends with the applicable PERMASWAGE chipless cutting tool:
- D12531-001, tubes 1/2", 3/4" and 3/8".

2 Put the tubing cutter into the correct place position on the tube (Ref. Fig. 203).

3 Tighten the drive screw untill the cutter wheel lighty touches the tube. Then give the drive screw a 1/8 to 1/4 turn.

4 Turn the ratchet handle through the ark of clearance until it turns loosely.

5 Repeat steps (2) through to (4) to cut through the tube.

6 Cut the tube slowly and smoothly to make sure that the end of the tube does not change its shape.

NOTE : Lubricate the ratchet,the rollers and the cutting wheel regularly with OILS (Mat. No. 03-001).

(b)Deburr the Tube (Ref. Fig. 206, 207, 208).

1 The internal diameter

a Use the deburring tool and the stem assembly that are correct for:
- the diameter of the tube,
- the thickness of the tube wall.

b Make sure that the deburring tool is clean. Lubricate it with **COMMON GREASE (Mat. No. 04-012).**

c Prepare to deburr the tube:
- hold the tube,
- push in the plunger of the tool,
- put the stem into the end of the tube,
- release the plunger and let the stem expand to seal the tube.

d Deburr the tube:
- continue to hold the tube,
- apply light pressure on the cutter and at the same time turn,
- the knurled body clockwise,
- continue until the tube is deburred.

e Do not push the plunger in, but:
- carefully and slowly pull the deburring tool from the tube until you can see the first ridge of the stem,
- clean the end of the tube and the stem.

f If the end of the tube is not correctly deburred:
- repeat steps (c) to (e).

g Carefully clean the tube with **CLEANING AGENTS (Mat. No. 11-003)** and dry it immediately.

h Blow air through the tube to remove all swarf and other foreign matter.

2 The external diameter

CAUTION : BURRS ON THE EXTERNAL DIAMETER OF THE TUBE CAN CAUSE DAMAGE TO THE SEALS IN THE FITTINGS. THIS DAMAGE CAN CAUSE EXTERNAL LEAKAGE.

a Remove the burrs on the external diameter of the tube with grade 240 emery cloth.

NOTE : The maximum distance between the ends of the tube is 6.36 mm (0.25 in.).

(3)Tube Repair

**WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.**

NOTE : The H-fitting is approved for the permanent repair of middle line tubes when:
- the applicable swaging equipment or other special tools are

not available,
- the repair must be immediate, (this repair procedure is faster than other repair procedures).

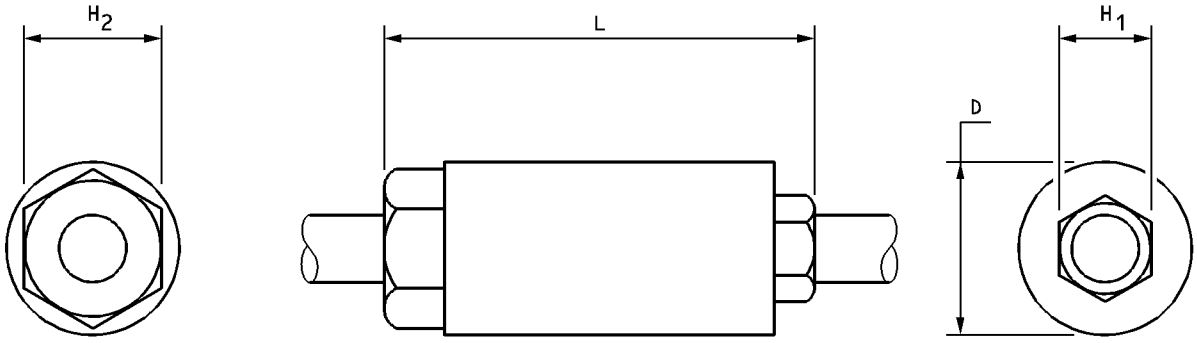
NOTE : There are four different types of repair procedures (Ref. Fig. 202).
Use the applicable fitting (refer to the H-fitting dimension and part number table (Ref. Fig. 228).
Each fitting is supplied in a plastic bag which also contains a positioning template and tape.

(a)Installation procedure for SIERRACIN/HARRISON H-fittings (Ref. Fig. 229).

NOTE : You can repair defects or chafing areas that are less than or equal to 9.52 mm (0.37 in.) across. You must splice defects that are larger. The minimum dimension that you can splice is 114.3 mm (4.50 in.).

1 Carefully clean the tube ends, the inside diameter and the outside diameter with CLEANING AGENTS (Mat. No. 11-003).
2 Use the template to position the tape (5) on the tube at 14.22 +0.5 -0 mm (0.56 +0.02 -0.00 in.) from the end of the tube.
3 Mark the tube for insertion at 36.6 +0 -0 mm (1.44 +0 -0 in.) from the other end of the tube.
4 Position the nut (1), the union (2), the coupling (3) and the slide (4) in the correct sequence on the tube.
5 Tape on only one layer of tape (5), cut off any unwanted tape.
6 Put the union (2) in the position against the tape (5).
7 Engage the slide (4) on the tube. The rounded end of the slide must be against the union (2).
8 Engage the nut (1) on the same side as the slide (4).
9 Engage the coupling (3) on the same side as the union (2).
10 Engage the nut (1) in the coupling (3) and tighten it with the union (2) against the tape (5).
11 Hold the coupling end (3).
NOTE : Do not turn the coupling (3).
12 Tighten the nut (1) until you feel resistance. this occurs when the slide (4) and the coupling (3) close tightly against the union (2).
13 Make sure that you can see the insertion mark on the tube.
14 Remove the nut (1). make sure that the slide (4) and the coupling (3) are between 3.8 mm (0.15 in.) and 0 mm (0.00 in.) from the shoulder of the union. If not, tighten the nut (1) until the slide (4) and the coupling (3) are in the correct position.
15 The union (2) must touch the tape (5).
16 The edge of the coupling (3) must be across the insertion mark on the tube.
17 Tighten the assembly to complete the swaging procedure.

(4)Leak Test of the Repaired Tube
(a)Remove the warning notice.
(b)Replenish the potable water system (Ref. 12-15-38 P. Block 1).
(c)pressurize the potable water system (Ref. 38-40-00, P. Block 301).
(d)Inspect the repaired tubing for leaks.

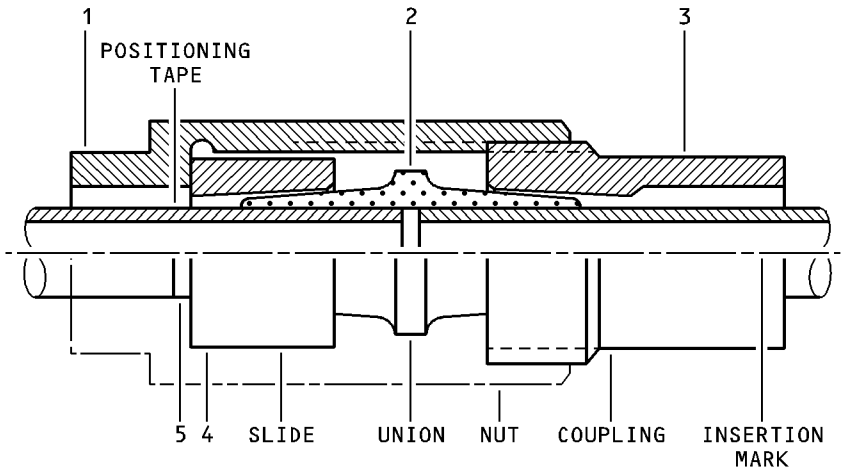


SIERRACIN/ HARRISON PART NUMBER	TUBE O.D.		"D" DIA		"H_1"		"H_2"		"L" BEFORE SWAGE		"L" AFTER SWAGE	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
36011V06	3/8	9.52	0.950	24.13	.625	15.87	.750	19.05	3.14	79.76	2.35	59.69
36011V08	1/2	12.70	1.125	28.56	.750	19.05	.875	22.22	3.25	82.55	2.35	59.69
36011V12	3/4	19.05	1.420	36.07	.938	23.83	1.250	31.75	3.43	87.12	2.95	74.93

BM6 20 23 38 2 BGM0 00

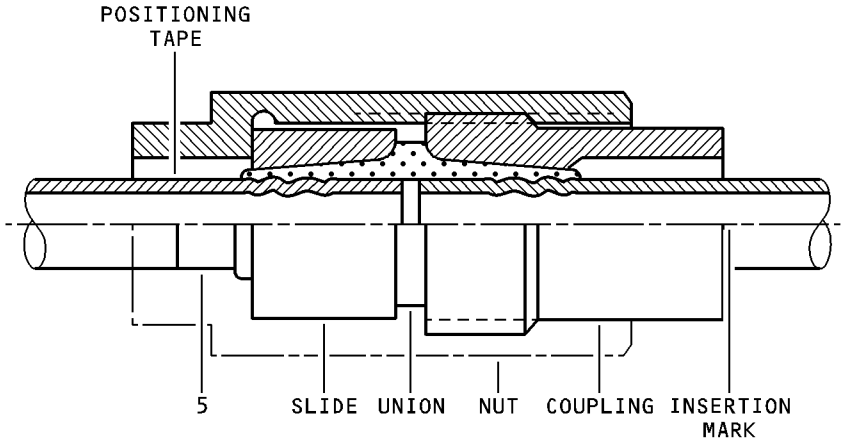
Part Numbers and Dimensions of the H-Fitting
Figure 228

BEFORE



WHEN THE NUT SLIDE, UNION, AND COUPLING ARE IN POSITION ON THE TUBE : THE CLEARANCE BETWEEN THE CUT TUBE ENDS IS IN THE CENTER OF THE UNION ONE END OF THE UNION TOUCHES THE TAPE.

AFTER



WHEN THE H- IS SWAGED (TORQUED), THE SLIDE AND THE COUPLING CLOSE TIGHTLY ON THE UNION TO MAKE A PERMANENT SEAL. THE UNION REMAINS AGAINST THE TAPE. THE HEX-END OF THE COUPLING CUTS ACROSS THE MARK.

BM6 20 23 38 2 BHMO 00

H-Fitting Installation
Figure 229

(e)If there is leakage, slowly and continuously increase the torque value to the maximum authorized (maximum test value) until you stop the leak (Ref. Fig. 218).
NOTE : Leaks are not permitted.
(f)Install the potable water de-icing elements as necessary.
(5)Leak test of air supply lines.
(a)Inspect the air supply tubing for leaks.
(b)If there is leakage, slowly and continuously increase the torque value to the maximum authorized (maximum test value) until you stop the leak (Ref. Fig. 218).
NOTE : Leaks are not permitted.
(6)Close-Up
(a)Make sure that the work area is clean and clear of tools and other items.
(b)Install any removed panels and or doors.
(c)Sterilize the potable water system (Ref. 38-10-00, P. Block 301).
(d)De-energize the ground service network (Ref. 24-41-00, P. Block 301).

7. Temporary Repair of Potable Water System Tubes with MS21922 sleeves to be Carried out in the Workshop

A. Equipment and Materials

ITEM	DESIGNATION
A. Material No. 04-003	Common Greases (Ref. 20-31-00)
B. Material No. 11-003	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 12-24-38, P. Block 1	Potable Water System - Draining
- 24-41-00, P. Block 301	AC External Power Control
- 38-40-00, P. Block 301	Air Supply

B. Procedure

(1)Job Set-Up

(a)Energize the ground service network (Ref. 24-41-00, P. Block 301).

(b)Drain the potable water system (12-24-38, P. Block 1).

(c)Depressurize the potable water system (38-40-00, P. Block 301).

(d)Put a warning notice in position to tell the personnel not to fill or pressurize the potable water system.

(2)Temporary Repair of the potable water system Tubes with MS21922 sleeves (Ref. Fig. 230)

CAUTION : DO NOT USE MS21922 FOR PERMANENT REPAIRS. THESE SLEEVES ARE FOR TEMPORARY REPAIRS (NO MORE THAN 2500 FLIGHT HOURS). COMPLETE THIS PROCEDURE WITH THE APPLICABLE PERMANENT REPAIR PROCEDURE.

NOTE : You can use MS21922 sleeves on tubes that have MS33514 or MS33515 fittings. No special tools are necessary. The subsequent separation of joints with MS sleeves is possible.

(a)Determine the length of tube to be cut see (Ref. Fig. 231) (Ref. Fig. 232, 233, 234).

(b)Cut the tube.

(c)Deburr the tube ends, inside and outside diameters (Ref. Fig. 203, 207).

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

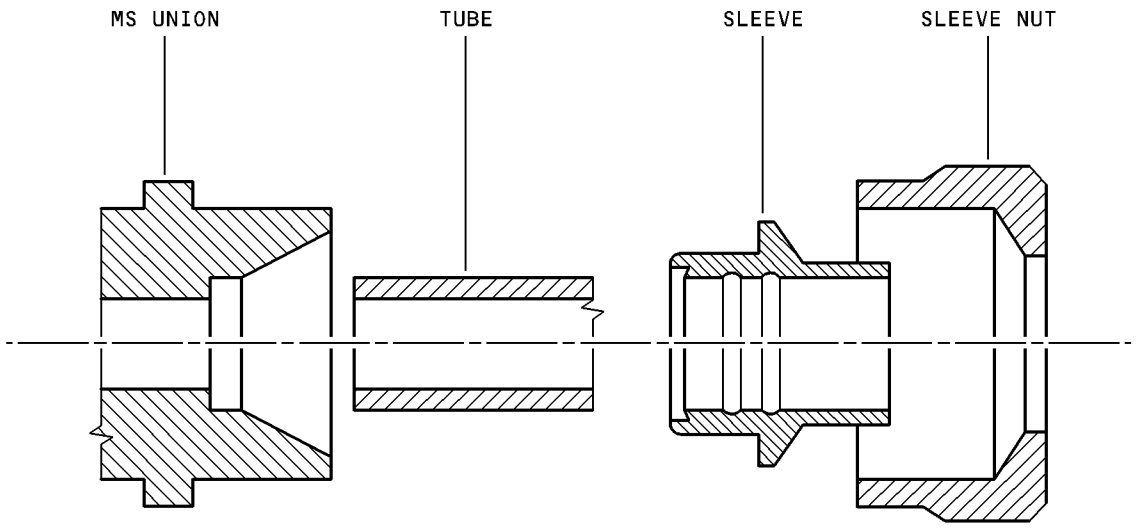
WARNING : WEAR PROTECTIVE GOGGLES WHEN USING COMPRESSED AIR.
DEBRIS AND/OR HIGH PRESSURE AIR CAN DAMAGE YOUR EYES.
DO NOT POINT COMPRESSED AIR AT YOUR SKIN AS THE AIRSTREAM CAN CAUSE CUTS.

GET MEDICAL HELP IF NECESSARY.

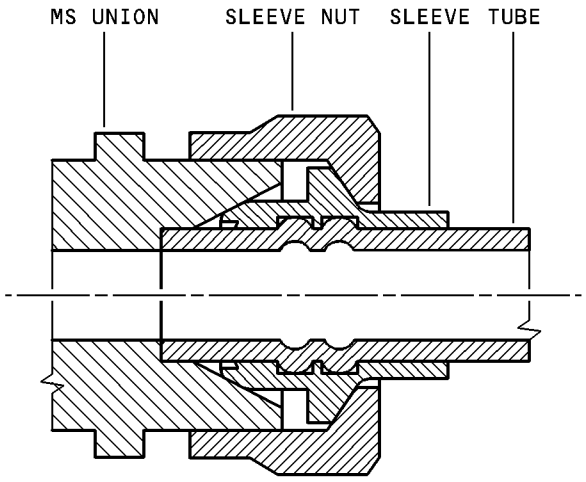
(d)Clean the end of the tube with CLEANING AGENTS (Mat. No. 11-003).
(e)Blow air through the tube to remove all the swarf and other foreign materials.
(f)Install the fitting.
1 Put the nut and the sleeve on the tube.
NOTE : Make sure that the cutting edge of the sleeve points to the end of the tube.
2 Lubricate with COMMON GREASE (Mat. No. 04-003).
NOTE : No grease is permitted in the tube ends,
- the threads and the contact face of the nut,
- the threads of the union.
(g)Swage the joint
1 Hold the tube against the shoulder of the union and tighten the nut nut as far as possible by hand.
2 Tighten the nut fully to swage the the sleeve.
(h)Inspect the tube joint.
1 Loosen the nut and visually inspect the swaging of the sleeve:
- there must be a small bulge between the cutting edge and the contact shoulder of the nut,
- the surface of the sleeve must be smooth (there must be no cracks or surface defects),
- the end of the sleeve must not be flat (the nut must move freely along the sleeve).
(j)Clean the tube.
WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

1 Clean the end of the tube with CLEANING AGENTS (Mat. No. 11-003).
(k)Install the lines. Use the specified TORQUE values (refer to the table) (Ref. Fig. 235).
NOTE : You must use these torque values each time that you assemble the tubes.
(l)Pressure test the tubes.
1 Connect the HARRISON sleeve and the union of the tube and TORQUE it to the normal value (Ref. Fig. 218).
2 Pressurize the tube to an operational pressure.
3 If there is leakage, slowly and continuously increase the TORQUE value to the maximum authorized (maximum test value) until you stop the leak.
4 Make sure there is no leakage.
NOTE : Leakage is not permitted.
(m)Install the Repaired tube.

BEFORE SWAGING

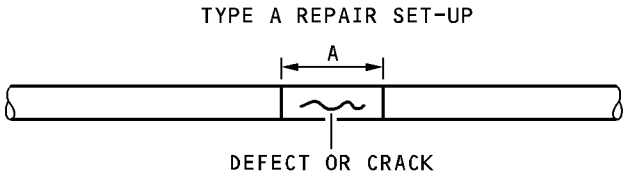


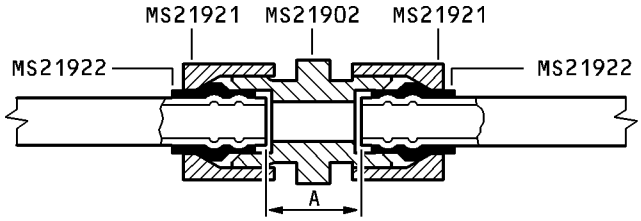
AFTER SWAGING

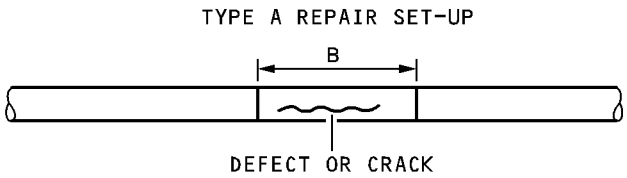


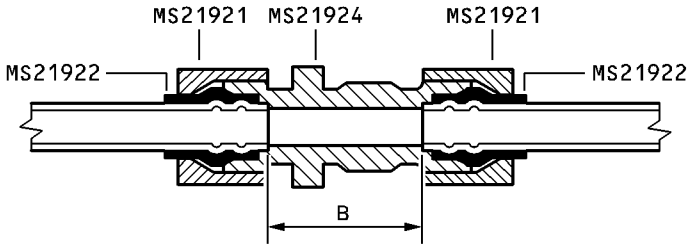
BM6 20 23 38 2 BJM0 00

Repair Procedure with the MS sleeve
Figure 230







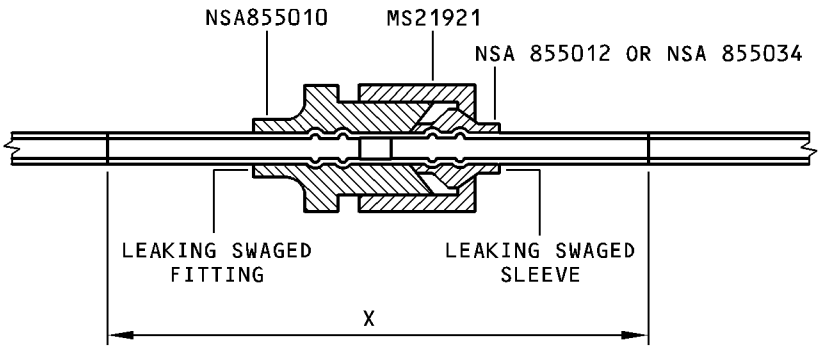


TUBE DIA	mm	9.52	12.70	19.05
	in.	3/8	1/2	3/4
DIM A	mm	18.0	20.0	27.2
	in.	0.71	0.79	1.07
DIM B	mm	33.5	36.6	45.8
	in.	1.32	1.44	1.80

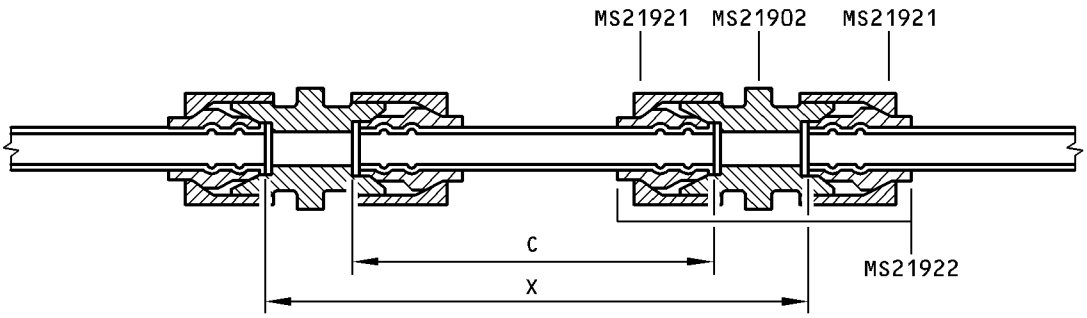
BM6 20 23 38 2 BKM0 00

Repair of the Straight Tube Section
Figure 231

BEFORE



AFTER

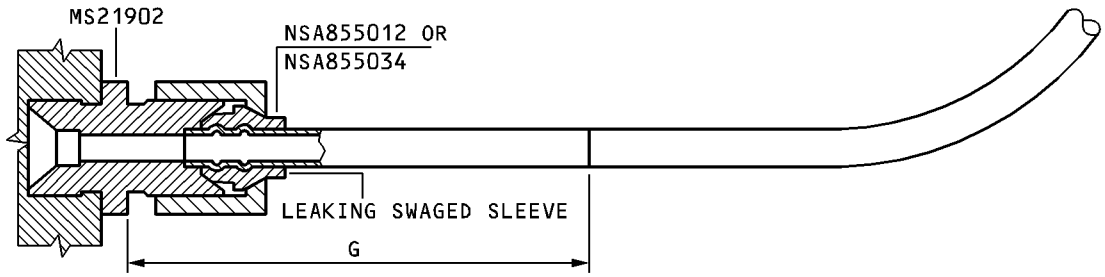


TUBE DIA	mm	9.52	12.70	19.05
	in.	3/8	1/2	3/4
DIM C	mm	51	56	59
	in.	2.00	2.20	2.32
DIM X	mm	87	96	113.4
	in.	3.42	3.78	4.46

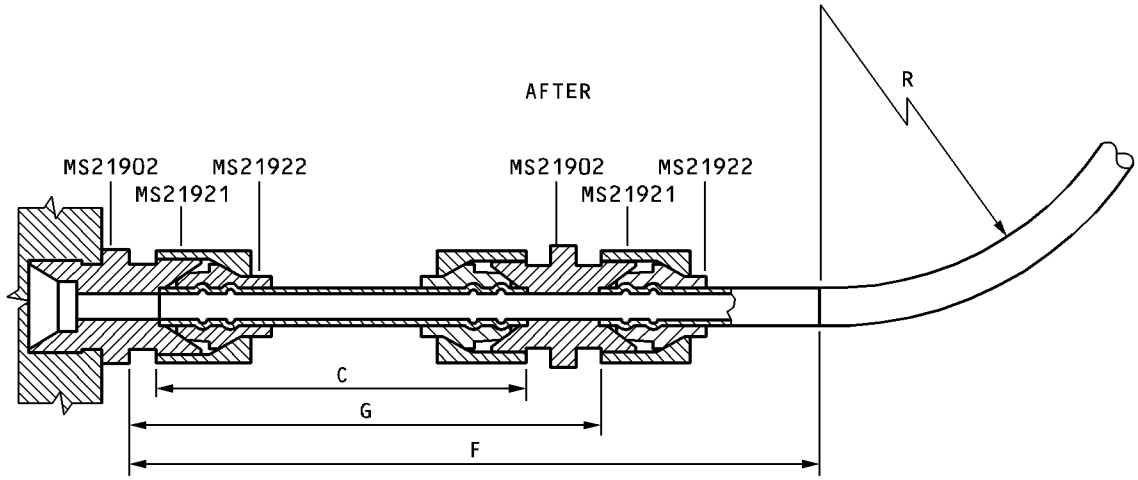
BM6 20 23 38 2 BLM0 00

Repair of the Union
Figure 232

BEFORE



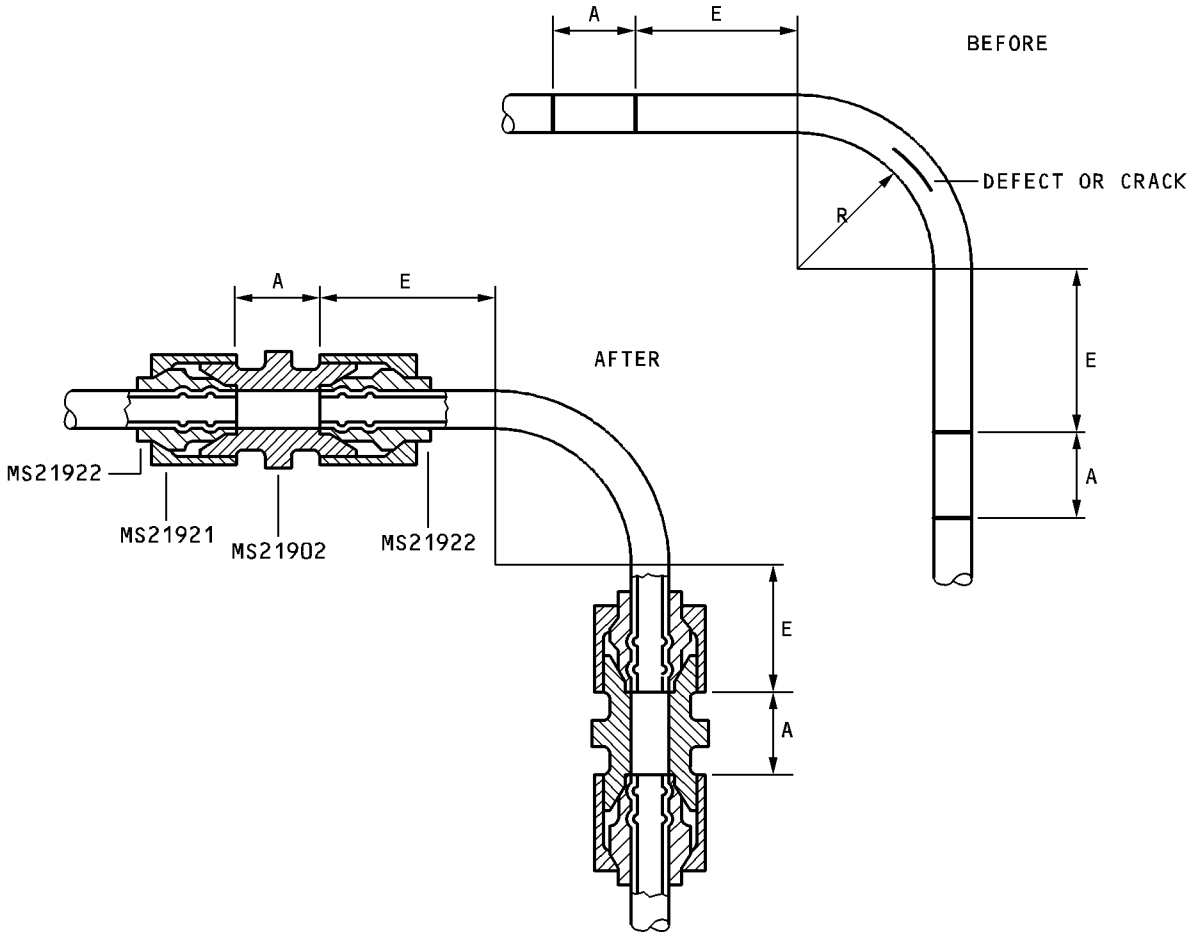
AFTER



TUBE DIA	mm	9.52	12.70	19.05
	in.	3/8	1/2	3/4
DIM C	mm	51	56	59
	in.	2.00	2.20	2.32
DIM F	mm	100	110	124
	in.	3.94	4.33	4.88
DIM G	mm	74.6	82.3	94.8
	in.	2.94	3.24	3.73

BM6 20 23 38 2 BMM0 00

Repair of the Tube End
Figure 233



TUBE DIA	mm	9.52	12.70	19.05
	in.	3/8	1/2	3/4
DIM A	mm	18.0	20.0	27.2
	in.	0.71	0.79	1.07
DIM E	mm	25	28	29
	in.	0.98	1.10	1.14

BM6 20 23 38 2 BNM0 00

Repair of the Elbow
Figure 234

TUBE DIA		NUMBER OF TURNS FOR THE NUT MS21921	
in.	mm	TUBE IN 21.6.9	TUBE IN 6061.T6
3/8	9.52	1 1/4	1 1/6
1/2	12.70	1 1/4	1 1/6
3/4	19.05	1 5/12	1 1/12

INITAL TORQUE FOR THE NUTS MS21921

TUBE DIA		TORQUE VALUES							
		TUBE IN 21.6.9				TUBE IN 6061.T6			
		MIN.		MAX.		MIN.		MAX.	
in.	mm	m.daN	lbf.in.	m.daN	lbf.in.	m.daN	lbf.in.	m.daN	lbf.in.
3/8	9.52	2.9	257	3.2	283	1.8	159	2.0	177
1/2	12.70	5.4	477.5	5.9	522.5	3.0	265	3.3	292
3/4	19.05	9.7	859	10.7	947	4.8	425	5.3	468.5

TORQUE VALUES FOR THE NUTS MS21921

BM6 20 23 38 2 BPM0 00

Initial Torque values - Torque Values for the Nuts MS21921
Figure 235

8. Installation of the Tube Assembly of the Potable Water System and the Air Supply lines

A. Equipment and Materials

ITEM	DESIGNATION
A.	Tape NSA 0141-25A

Referenced Procedures

- 12-15-38, P. Block 1	Replenishing Potable Water
- 12-24-38, P. Block 1	Potable Water System - Draining
- 20-21-12, P. Block 1	Tightening Torques of the Standard Threaded Fasteners
- 20-28-11, P. Block 1	Electrical Bonding
- 24-41-00, P. Block 301	AC External Power Control
- 38-10-00, P. Block 301	Sterilization of the Potable Water System
- 38-40-00, P. Block 301	Air Supply
- 38-40-00, P. Block 501	Air Supply

B. Procedure

(1)Job Set-Up

(a)Energize the ground service network (Ref. 24-41-00, P. Block 301).

(b)Drain the potable water system (12-24-38, P. Block 1).

(c)Depressurize the potable water system (38-40-00, P. Block 301).

(d)Put a warning notice in position to tell the personnel not to fill or pressurize the potable water system.

(2)Installation of the tubing with HARRISON sleeves and fittings (Ref. Fig. 201)

WARNING : MAKE SURE THAT THE EQUIPMENT YOU USE FOR THIS PROCEDURE IS CLEAN AND APPROVED FOR THE POTABLE WATER SYSTEM. IF NOT IT CAN CAUSE CONTAMINATION OF THE POTABLE WATER SYSTEM.

WARNING : MAKE SURE THAT THE POTABLE WATER SYSTEM IS DEPRESSURIZED. A PRESSURIZED SYSTEM CAN CAUSE INJURY TO PERSONS WHEN THEY DO WORK ON IT.

(a)Make sure that all the equipment items to be connected are in the correct position so that it will not be necessary to remove the tubing subsequently.

(b)Make sure that you flush the lines before installation.

(c)Make sure that the threads of the fittings are in the correct condition.

(d)Remove the blanking caps.

(e)Make sure that the tube ends, the sleeves and the unions are clean and in the correct condition.

(f)Make sure that the tubes are in the correct condition (Ref. Fig. 236).

(g)Make sure that the tubes are correctly identified with tape NSA 0141-25A.

NOTE : Discard tubes that have indentations with a depth of more than 0.05 mm (0.0019 in.). Two causes are possible for these indentations:
- a torque value that was to high during installation,

- tube has been installed and removed to many times.

(h)Put the tubing in position.

(j)Make sure that the electrical bonding is correct (Ref. 20-28-11, P. Block 1).

(k)Torque the connections to the applicable values (Ref. 20-21-12, P. Block 1).

(3)Leak test of the installed tube assembly.

(a)Remove warning notice.

(b)Replenish the potable water system with water (Ref. 12-15-38, P. Block 1).

(c)Pressurize the potable water system. (Ref. 38-40-00, P. Block 301).

(d)Inspect the repaired tubing for leaks.

(e)If there is leakage, slowly and continuously increase the **TORQUE** value to the maximum authorized (maximum test value) until you stop the leak.

NOTE : Leaks are not permitted.

(f)Remove the container.

(g)Install the potable water system de-icing elements as necessary.

(4)Leak test of the air supply lines.

(a)Inspect the repaired air supply lines for leakage.

(b)If there is leakage, slowly and continuously increase the **TORQUE** value to the maximum authorized (maximum test value) until you stop the leak.

NOTE : Leaks are not permitted.

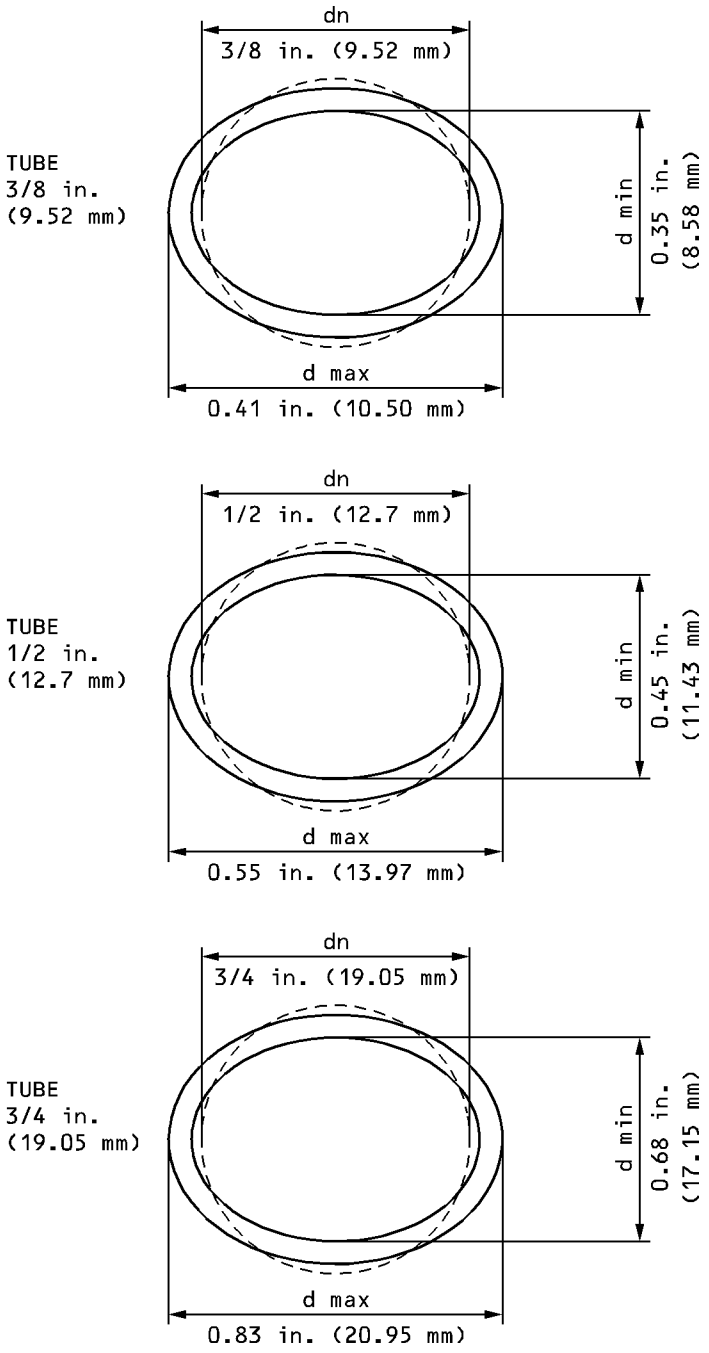
(5)Close-Up

(a)Make sure that the work area is clean and clear of tools and other items.

(b)Install any removed panels and/or doors.

(c)Sterilize the potable water system (Ref. 38-10-00, P. Block 301).

(d)De-energize the ground service network (Ref. 24-41-00, P. Block 301).



NOTE:

d max = max. outer diameter of tube
d min = min. outer diameter of tube
d n = nom. tube diameter

BM6 20 23 38 2 BRMO 00

Permissable Tube Defect Depth - Stainless Steel Tube Material
Figure 236

INSTALLATION OF EXPANSION JOINTS

1. Reason for the Job

This topic shows the typical installation of the expansion joints. This typical installation prevents damage to the bleed duct seals and leakage.

2. Equipment and Materials

ITEM	DESIGNATION
A. Material No. 04-007	Common Greases (Ref. 20-31-00)
B. Material No. 06-012	Lubricants (Ref. 20-31-00)

3. Procedure

A. Installation of Expansion Joints
(Ref. Fig. 001)

(1)Visual inspection

(a)Make sure that the seal housings on the female duct and the contact surface on the male duct are clean and that there are no deposits.

NOTE : If you find dirt or deposits, you must clean, flush and dry the surface(s) before you install a new duct seal.

(2)Seal installation

NOTE : Remove the seal(s) from the packaging immediately before you install it (them). Make sure that you do not cause contamination of the seal with chemicals or dust particles during its installation.

R NOTE : Each time you disconnect an expansion joint or you remove
R a sleeve, you must discard the seals on the flanges and replace
R them with new ones.

(a)For ABS0737-XXX seals and Pre ABS1040-XXX

1 Carefully install the seal ABS0737-XXX in the housing grooves. Make sure that you install the seal in the correct direction and the correct position.

NOTE : ABS0737-XXX seal type is the recommended replacement P/N.
Other seal types found in service are :
- ABS0737-XXX,
- NSA8054-XXX-08 with NSA8054-XXX-09,
- ABS0605-XXX,
- ABS0632-XXX.

(b)For ABS1040-XXX

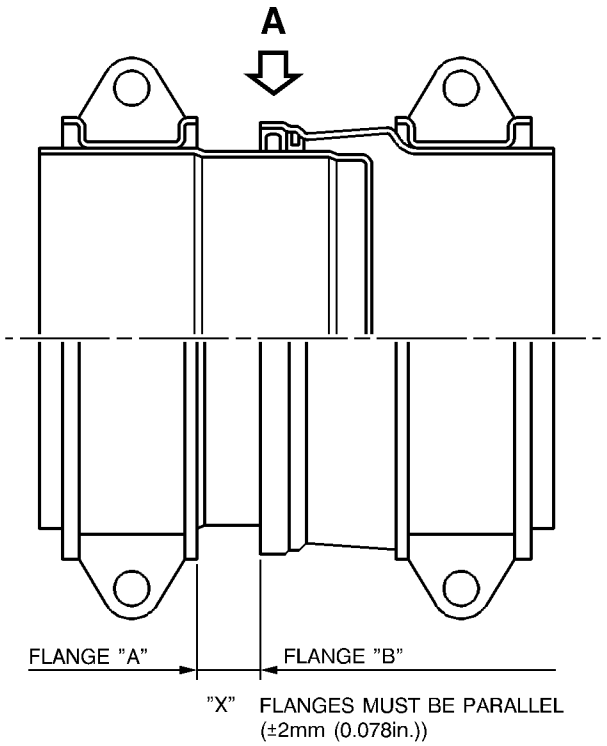
1 Install the outer ring (1) in the duct groove.

2 Carefully install the inner ring (2) with the spring on the pressure side.

(3)Lubricant

(a)For ABS0737-XXX seals and Pre ABS1040-XXX

NOTE : Seals are supplied pre-lubricated and normally require no additional lubrication. In areas where installation is difficult (ducting angulation), you can apply a thin film of lubricant on the inner surface of the seal or on the sliding surface.



BM5 20 26 00 0 BAM0 00

Installation of Expansion Joint
Figure 001

R

Recommended lubricants :
- For ABS0737-XXX seal type, use only Common Grease (Material No. 04-007),
- For other types of seals, use Common Grease (Material No. 04-007) or Lubricants (material No. 06-012).

(b)For ABS1040-XXX

CAUTION : ABS1040-XXX IS A SINGLE GROOVE SEAL. NO LUBRICANT HAS TO BE APPLIED PRIOR TO AND/OR DURING INSTALLATION.

(4)Duct connection

(a)For ABS0737-XXX seals and Pre ABS1040-XXX

1 Engage the male sleeve in the seal and connect the ducts. Make sure that you do not damage the seal during the operation.

2 Align the two ducts on the same axis. The misalignment must not be more than 3 degrees in all directions.

- Measure the distance "X" between the duct flanges "A" and "B" : (Ref. Fig. 001)

This distance must be the same (± 2 mm (0.078 in.)) around the full circumference of the duct to make sure that the two flanges are parallel.

Make sure that there are no side loads in the assembly.

(b)For ABS1040-XXX

1 Carefully install the male duct in the female sleeve and move the duct around slightly to make the seal agree with the shape of the duct

2 Align the two ducts on the same axis. The misalignment must not be more than 3 degrees in all directions.

- Measure the distance "X" between the duct flanges "A" and "B" : (Ref. Fig. 001)

This distance must be the same (± 2 mm (0.078 in.)) around the full circumference of the duct to make sure that the two flanges

1. General

This procedure is applicable for the installation and bonding of the FLEXIFORM grommet.
This installation prevents damage when the bundles go through holes in the structure.

2. Installation and Bonding of the Grommet

A. Equipment and Materials

ITEM	DESIGNATION
A.	FLEXIFORM grommet NSA939510
R B. Material No. 08-078	BONDING AND ADHESIVE COMPOUNDS
R	(Ref. 20-31-00)
C. Material No. 11-003	CLEANING AGENTS (Ref. 20-31-00)

B. Procedure

(Ref. Fig. 201)

(1)Preparation before Installation

(a)Mating surfaces must be clean and degreased.

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY IN A WELL VENTILATED WORK AREA.
THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANTS.
DO NOT GET THEM IN YOUR EYES OR MOUTH.
DO NOT GET THEM ON YOUR SKIN.
DO NOT SMOKE IN THE WORK AREA.
DO NOT BREATHE IN THE GAS.
OBEY MANUFACTURERS INSTRUCTIONS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

(b)If not, clean the mating surfaces with CLEANING AGENTS (Material No. 11-003).

(c)Use a grommet (NSA939510) of the correct dimensions for the structure hole.

(d)Cut the grommet to the correct length. Make sure that the tension of the section is correct and that it is in a position opposite the wire.

(2)Bonding of the Grommet

WARNING : OBEY THE MANUFACTURER'S INSTRUCTIONS WHEN YOU USE THIS/THESE MATERIALS.
USE PROTECTIVE CLOTHING, RUBBER GLOVES AND GOGGLES.

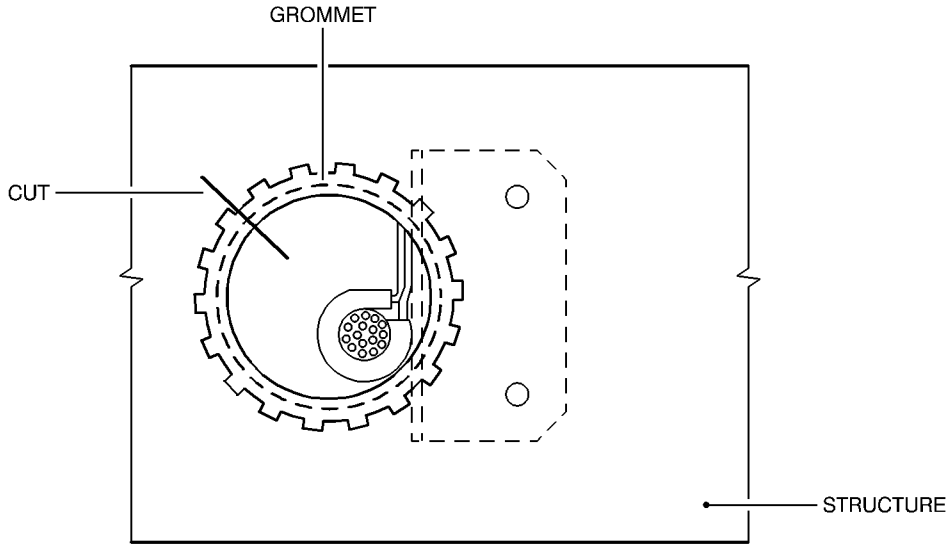
R (a)Apply a thin, smooth layer of HYSOL EA9394 (Material No. 08-078) on the two surfaces.

R (b)Push the two surfaces together to bond them.

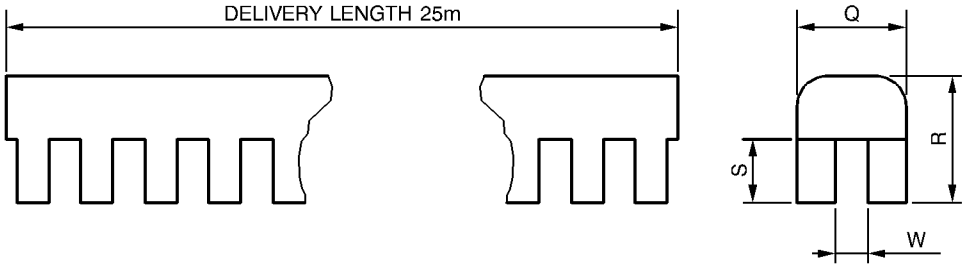
R (c)Apply a minimum pressure of 0.4 bar (5.80 psi) to keep the two surfaces together.

R (d)Release the pressure after 8 hours at 23°C (73.4°F) or 1 hour at 70°C (158°F).

R (e)Make sure that the grommet is correctly bonded on all the surfaces.



DIMENSIONS



SIZE CODE No.	W mm	Q mm	R mm	S mm	THICKNESS TO BE PROTECTED	WEIGHT g PER m
A	1.42	3.81	3.94	2.54	0.38 TO 1.32	22.6
B	2.29	4.45	3.94	2.54	1.32 TO 2.16	24.2
C	3.32	5.59	3.94	2.54	2.16 TO 3.25	28.9
D	4.95	8.26	5.84	4.06	3.25 TO 4.88	57.8
E	6.60	9.78	6.10	4.32	4.88 TO 6.48	65.5
F	8.13	11.30	6.48	4.57	6.48 TO 8.08	77.8
G	9.10	13.08	6.48	4.57	8.08 TO 9.65	100.1
H	13.08	16.26	6.48	4.57	9.65 TO 12.95	103.5

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Grommet - Installation and Dimensions
Figure 201

C. Close-up
(1)Make sure that the work area is clean and clear of tool(s) and other items.

ELECTRICAL BONDING - GENERAL

1. General

Three bonding procedures are used according to the part of the aircraft concerned:
- one for the fuselage, pylon and stabilizers (2),
- one for the wings (3),

- one for external composite components (4).

Follow the instructions given by:
- the table of maximum permissible resistance values (5),
- the test procedures (6).

(Ref. Fig. 001)

2. Electrical Bonding Procedures for the Fuselage, Pylon and Stabilizers

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY WITH A GOOD FLOW OF AIR THROUGH THE WORK AREA.
THESE MATERIALS ARE POISONOUS AND FLAMMABLE AND SKIN IRRITANTS.
OBEY THE MANUFACTURERS INSTRUCTIONS.
PUT ON PROTECTIVE CLOTHING.
DO NOT GET THEM IN YOUR MOUTH.
DO NOT SMOKE.
DO NOT BREATHE THE GAS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

These procedures cover the methods of electrical bonding of :
- non-removable components
- removable components
- fuel lines
- hydraulic lines, support blocks and clamps
- equipment mounts, clamp blocks or clamps.

A. Bonding of Components Which Are Non-Removable or Seldom Removed
(Ref. Fig. 002)

(1)Equipment and materials

ITEM	DESIGNATION
(a)	Power Wire Brushes
(b)	Emery Cloth, Grade 320
(c)	Lint-free Cloth
(d)Material No. 07-001	Lacquers (Ref. 20-31-00)
(e)Material No. 09-013	Sealants (Ref. 20-31-00)
(f)Material No. 11-004	Cleaning Agents (Ref. 20-31-00)

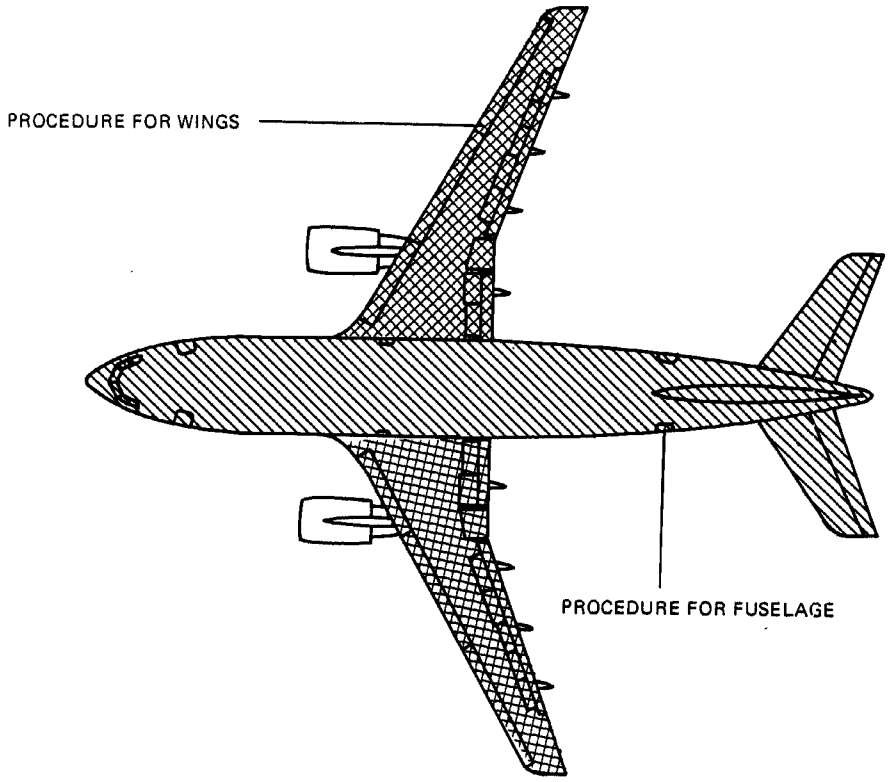
(2)Procedure

(a)Job set-up for light alloy and protective coated titanium components

1 Bare contact surfaces with a power wire brush.
NOTE : Use of a spot facer is forbidden.

2 Diameter of bared surface must be 4 mm (0.157 in.) greater than diameter of terminal lug, bolt head or washer to be installed.

3 For curved surfaces or surfaces difficult to reach, use Grade 320



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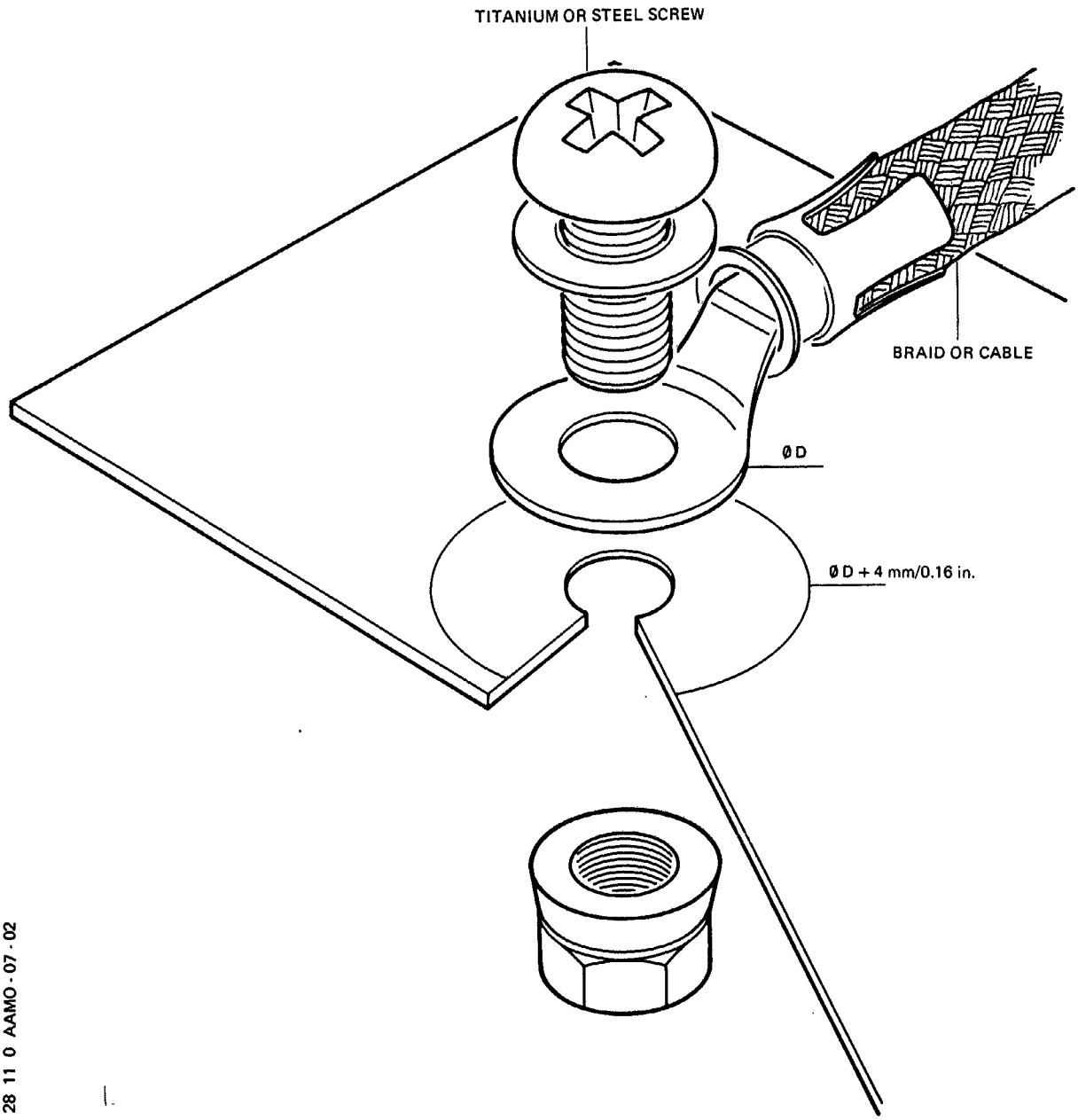
R

Electrical Bonding Areas
Figure 001



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Bonding Jumper Connection to Fuselage
Figure 002

emery cloth.

4 Remove dust and particles from bared surface using a lint-free cloth (Material No. 11-004), then wipe with a dry cloth.

(b)Job set-up for corrosion-resistant steel and untreated titanium

1 Clean all dust and particles from surface using a lint-free cloth with Material No. 11-004, then wipe with a dry cloth.

(c)Assembly

1 Assembly must be performed immediately after accomplishment of preceding operations.

NOTE : If assembly is postponed, repeat preceding operations.

NOTE : For bonding of valuable components, use a sacrificial angle wherever possible. Immediately after cleaning, install the sacrificial angle with rivets. (Ref. Fig. 003)

2 Screws must bed down tightly.

3 Torque values are given in following table:

TERMINAL DIAMETER		LUG SIZE	TORQUE	
mm	No. or In.		m.daN	lbf.in.
4.17	8	24-22-20	0.27	1.99
4.83	10	18-16-14-12	0.45	3.22
6.35	1/4	10-8-6	0.68	5.02
9.52	3/8	4	2.7	19.91

(d)Close-up and application of protective coating

Apply Material No. 09-013 or No. 07-001.
(Ref. Fig. 004)

NOTE : Material No. 07-001 allows visual check of the assembly.

B. Bonding of Removable Components/Hardware

In the case of removable components/hardware, no surface preparation is called for, but such components/hardware must be good electrical conductors.

The components/hardware (lugs, rivets, screws, etc.) and the countersinks and dimpling of holes must be free from insulating protective coating.

(1)Bonding to light alloy (use of a bonding jumper) (Ref. Fig. 005)

(a)Normal application: Bonding plate on light alloy lines and on structure.

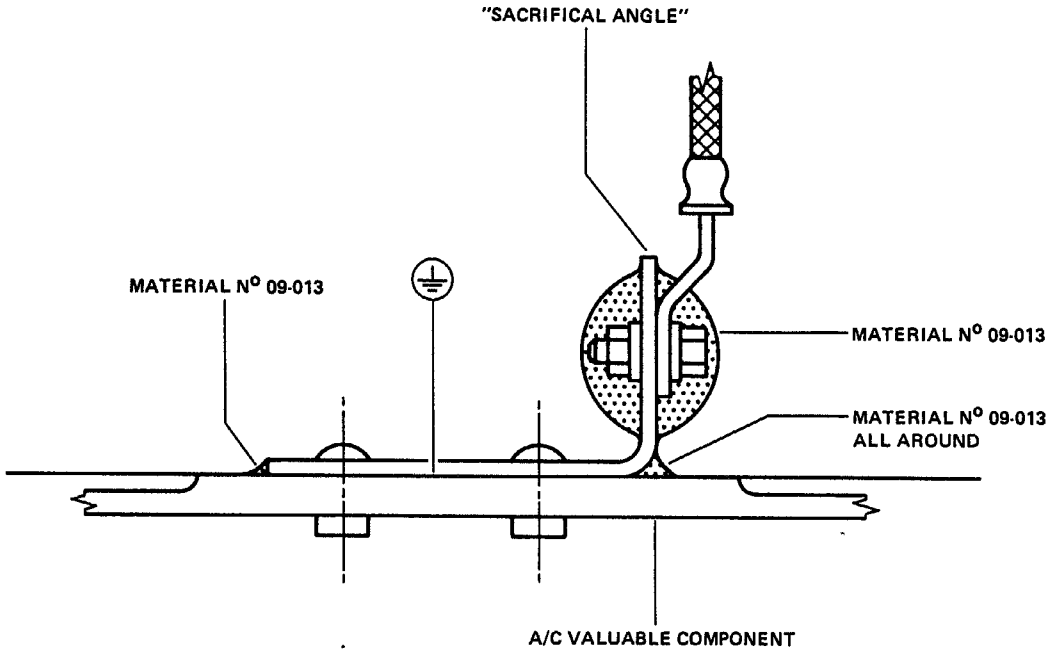
(2)Bonding to corrosion-resistant steel (use of a bonding jumper)

(a)Normal application: Bonding plate on corrosion-resistant steel pipes.

(3)Bonding light alloy/light alloy or light alloy/corrosion-resistant steel

(a)Normal application: Removable components, wing-to-nacelle feed-throughs.

R C. Bonding of Fuel Lines



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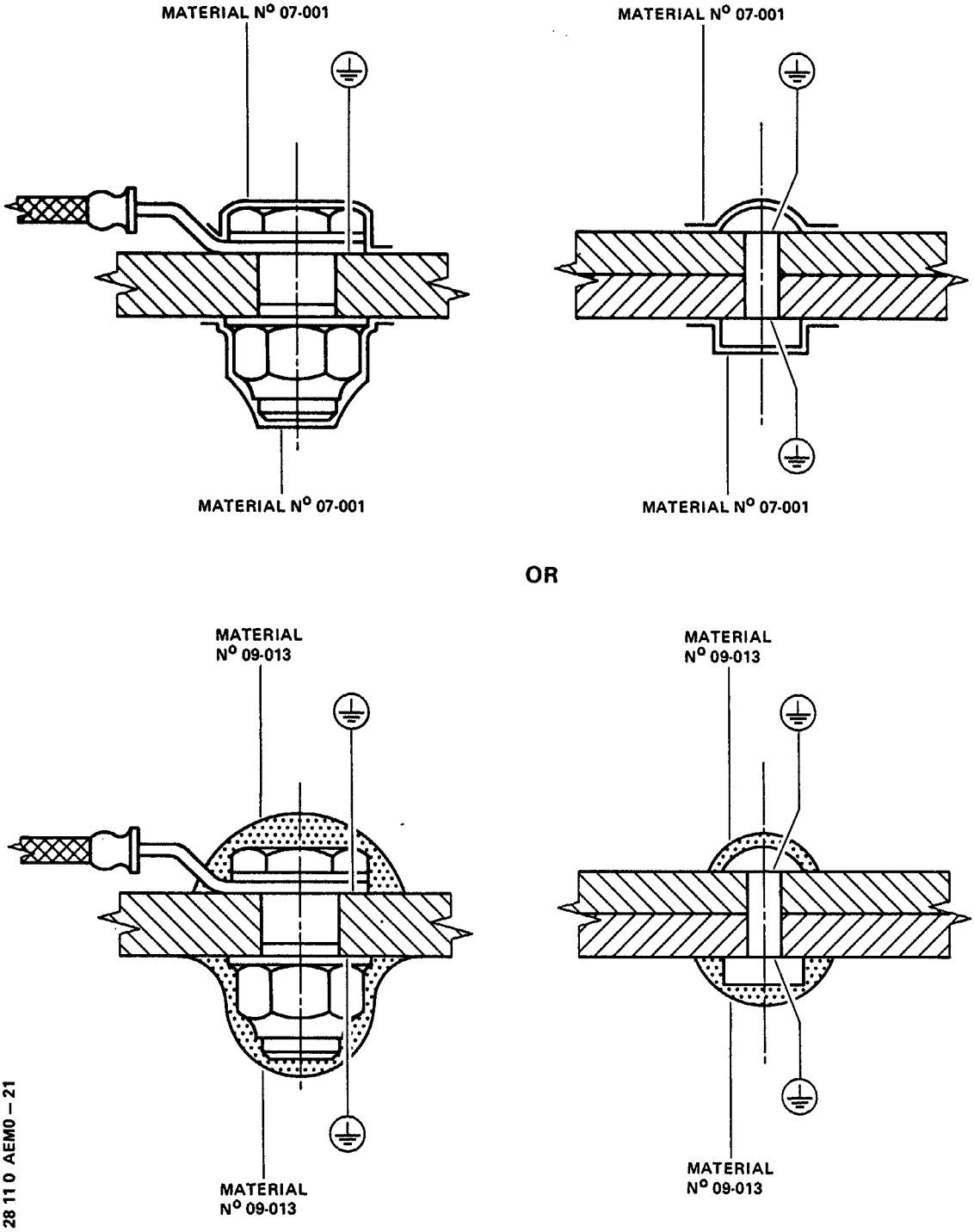
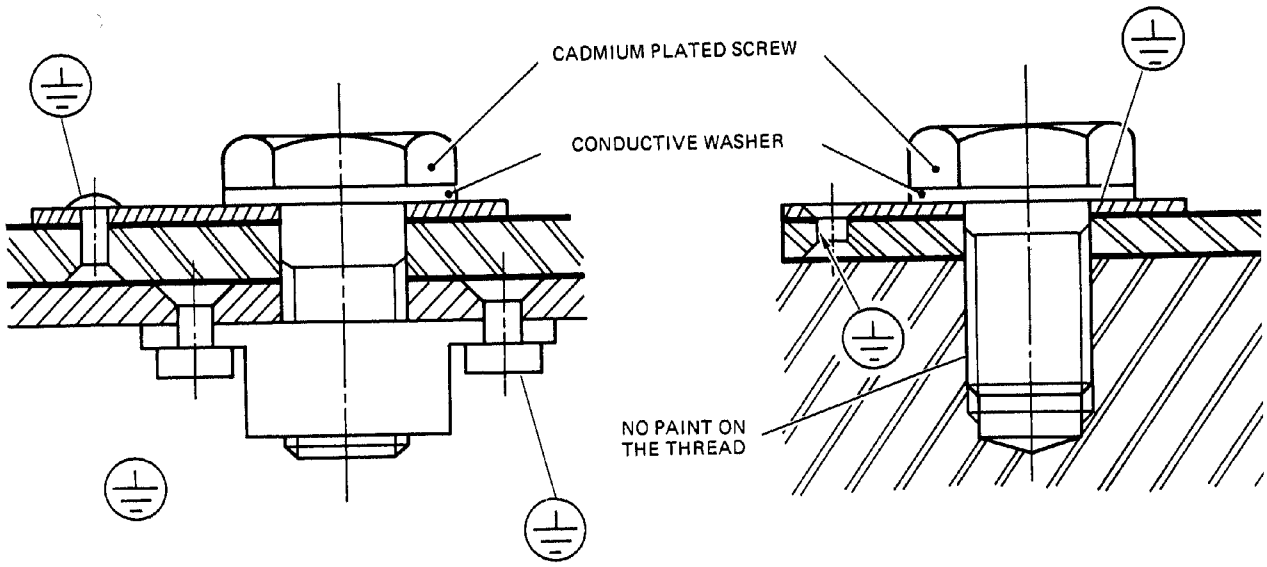
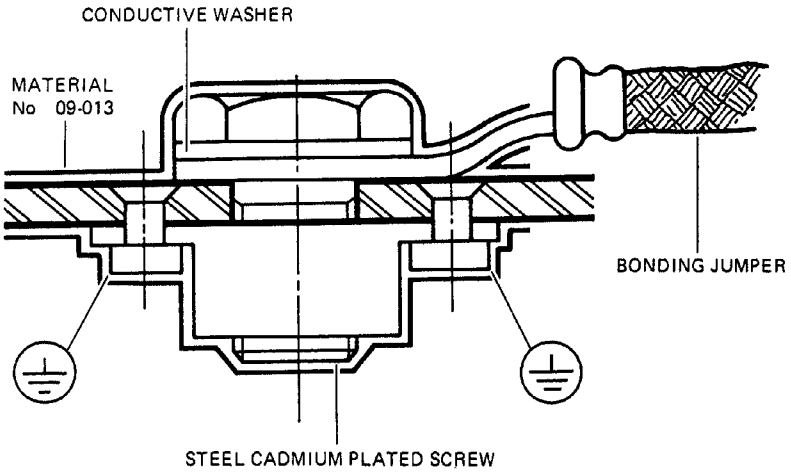
Bonding by Sacrificial Angle
Figure 003



Protection of Bonding Attaching Parts
Figure 004





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Bonding Light Alloy/Light Alloy or Light Alloy/Corrosion-Resistant Steel
Figure 005

(1)Bonding of lines of 3/4 in. or greater in light alloy or corrosion-resistant steel. (Ref. Fig. 006) See Detail A. In both cases, clamps are of the same material as lines to be bonded.
One end of bonding jumper must be permanently bonded to a single clamp, the other end must be connected in accordance with removable bonding procedure, either:
- to a clamp assembly
- to a bonding plate brazed to another line or attached to the structure by rivets
- to a clamp attaching screw or bolt.

This procedure applies to:

R - light alloy lines.

(2)Bonding of lines of less than 3/4 in. diameter.
These lines are attached to clamp blocks by clamps with integral bonding lugs. (Ref. Fig. 006) See Detail B.

D. Bonding of Hydraulic Lines, Clamp Blocks and Clamps

NOTE : Light alloy painted hydraulic return lines shall not be bonded.

(1)Equipment and Materials

ITEM	DESIGNATION
(a)	Emery Cloth, Grade 320
(b)Material No. 04-012	Common Greases (Ref. 20-31-00)
(c)Material No. 07-001	Lacquers (Ref. 20-31-00)
(d)Material No. 11-004	Cleaning Agents (Ref. 20-31-00)
(e)Material No. 12-005	Strippers (Ref. 20-31-00)
(f)	Brush

(2)Procedure

(a)Job set-up for uncoated light-alloy lines

1 Remove oxide coating from lines over an area 4 mm (0.157 in.) wider than clamp block or clamp by polishing with Grade 320 emery cloth.
NOTE : Avoid scratches.

2 Smear cleaned surface with Material No. 04-012.

(b)Job set-up for light-alloy lines with protective coating

1 Remove protective coating with Material No. 12-005 using a brush.

2 Smear cleaned surface with Material No. 04-012.

(c)Job set-up for corrosion-resistant steel lines

1 Clean contact surfaces of clamp block or clamp using Material No. 11-004.

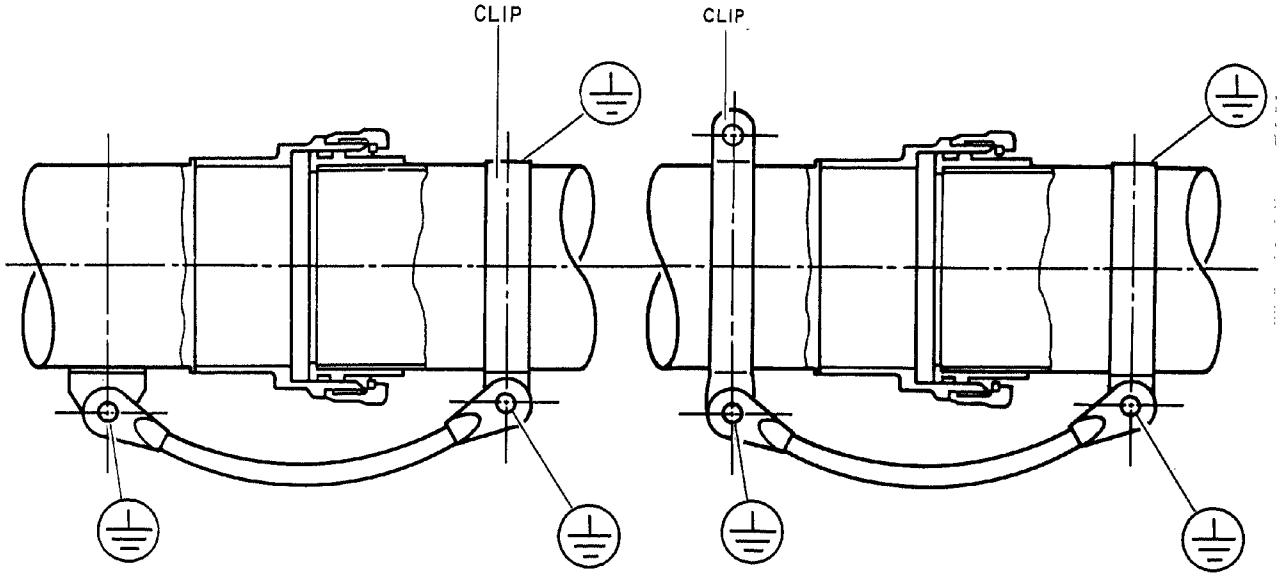
(d)Job set-up for bonding of clamps (Ref. Fig. 006), See Detail B.

1 With protective lined clamp, electrical bonding is by means of integral bonding lug.

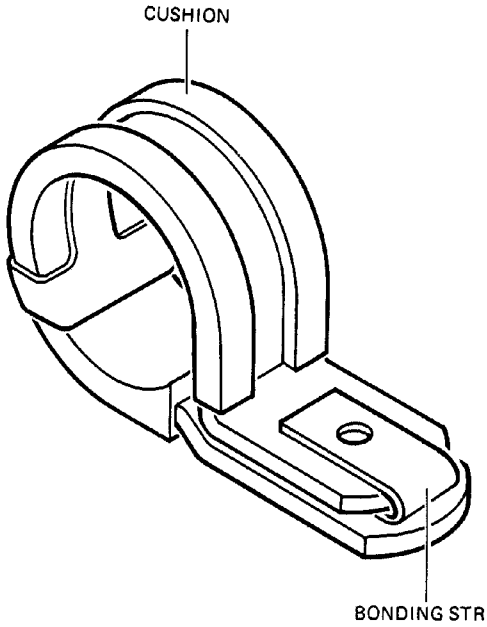
2 Before attaching clamp to mount, apply bonding procedure for removable components.

(e)Job set-up for bonding of clamp blocks on their mounts (Ref. Fig. 007)
NOTE : Shim washers must be correctly located when lines are installed in clamp block.

1 Polish contact surface over an area 2 mm (0.078 in.) to 4 mm (0.157 in.) wider than clamp block using Grade 320 emery cloth.



A BONDING OF LINES OF 3/4 IN DIAMETER OR GREATER



B BONDING OF LINES OF LESS THAN 3/4 IN DIAMETER

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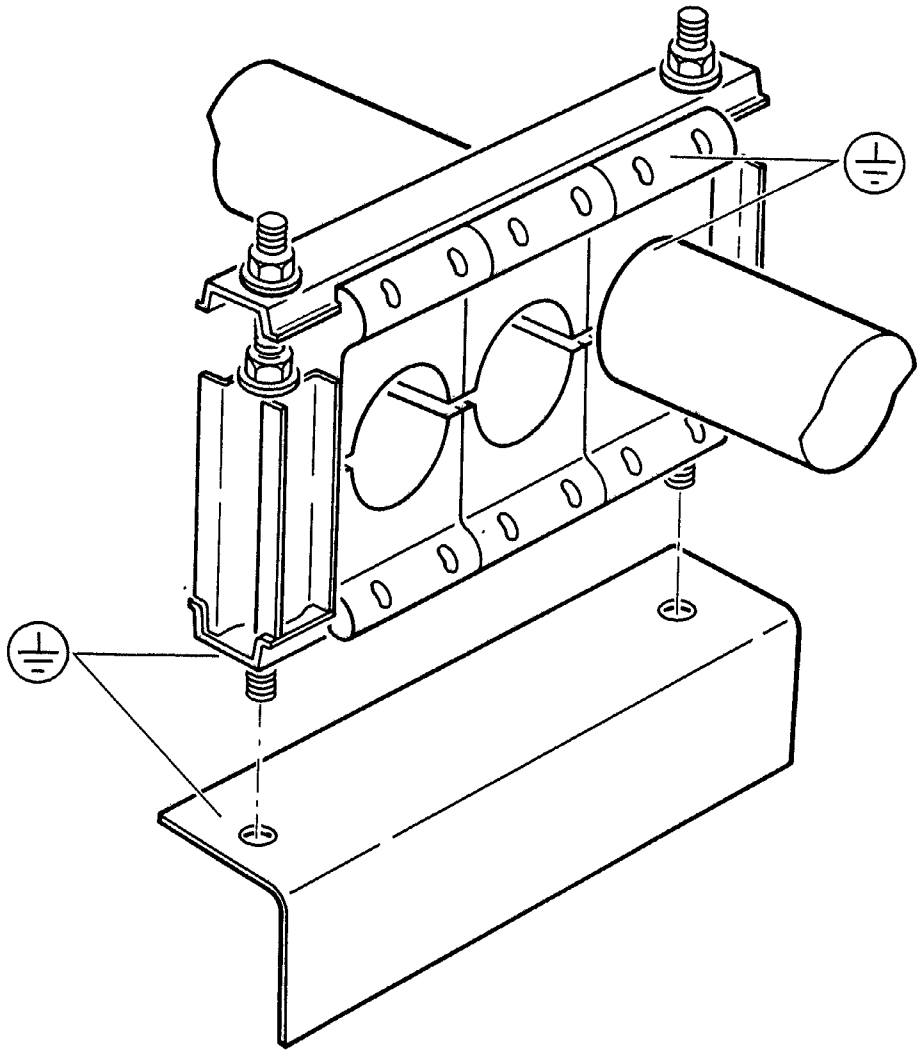
Bonding of Fuel Lines
Figure 006



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Bonding of Clamp Blocks on Mounts
Figure 007

2 Smear cleaned surface with Material No. 04-012.
3 Make certain that mating surface of clamp block is perfectly clean.
(f)Assembly and close-up
1 Install clamp block.
2 Remove excess Material No. 04-012.
3 Apply a coat of Material No. 07-001 or No. 09-013 to cleaned areas.
NOTE : Material No. 07-001 allows visual check of the assembly.

E. Bonding of Mountings (Ref. Fig. 008)

3. Electrical Bonding Procedures for Wings

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY WITH A GOOD FLOW OF AIR THROUGH THE WORK AREA.
THESE MATERIALS ARE POISONOUS AND FLAMMABLE AND SKIN IRRITANTS.
OBEY THE MANUFACTURERS INSTRUCTIONS.
PUT ON PROTECTIVE CLOTHING.
DO NOT GET THEM IN YOUR MOUTH.
DO NOT SMOKE.
DO NOT BREATHE THE GAS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

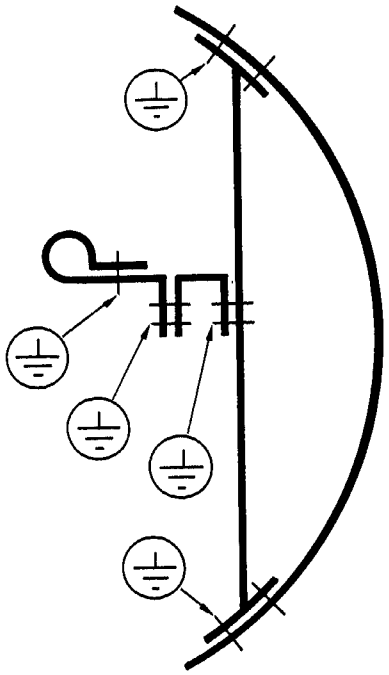
A. Introduction
These procedures cover the required methods of electrical bonding of the aircraft wing structures and equipment in order to:
- Prevent and/or dissipate precipitation static (p static)
- Minimize shock hazards from electrical supply and distribution systems.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Abrasive Paper Grade 1
(2)	Emery Cloth Grade 320
(3)	Lint-free Cloth
(4)	Masking Tape
(5)Material No. 04-012	Common Greases (Ref. 20-31-00)
(6)Material No. 09-001	Sealants (Ref. 20-31-00)
(7)Material No. 11-004	Cleaning Agents (Ref. 20-31-00)
(8)Material No. 09-007	Sealants (Ref. 20-31-00)
(9)Material No. 13-002	Pretreatment for Painting (Ref. 20-31-00)

C. Preparation for Electrical Bonding

NOTE : Electroplated equipment; e.g. cadmium, tin, is conductive and may be connected directly by the electrical bonding medium.
Do not use abrasives when cleaning this equipment.
(1)Remove all traces of grease and oil, using cleaning agent (Material No. 11-004).
(2)Mask off the area to be prepared and remove the protective treatment (anodizing, paint, etc.) using abrasive paper grade 1 or emery cloth



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Bonding of Mountings
Figure 008

grade 320. Remove all traces of dust using a clean lint-free cloth.

(3)Remove any protective treatment from bonding components (bolts, washers, nuts, clips, etc.) and clean using cleaning agent (Material No. 11-004).

NOTE : Complete any electrical bonding within four hours of cleaning, otherwise temporarily protect by applying a film of (Material No. 04-012) to cover the cleaned area.
Remove temporary protection using cleaning agent (Material No. 11-004) immediately before making connection.

D. Bonding Methods

(1)Bonding by direct contact (Ref. Fig. 009)

(a)Remove protective treatment and clean equipment in accordance with Para. C.

(b)Apply a line of sealant (Material No. 09-001) under the keel of the equipment or component, then assemble the equipment and fasteners.

(c)Assemble equipment and fasteners, torque tighten and check resistance (Refer to Para. 5.).

(d)Overseal the bolt head and nut, also apply a fillet of polysulphide sealant (Material No. 09-007) between the equipment foot and structure to exclude moisture from unprotected surfaces and to overlap the sand existing protective treatment.

(2)Bridging contact bonding via conducting bolt and nut oversealed (Ref. Fig. 010) see Detail A.

(a)Remove protective treatment and clean equipment in accordance with Para.C.

(b)Assemble equipment and fasteners, torque load and check resistance (Refer to Para. 5.).

(c)For wet areas and where equipment is rarely removed, overseal head of nut and bolt assembly using sealant (Material No. 09-001) ensuring fillet of sealant covers washer to exclude moisture from unprotected surfaces and to overlap existing protective treatment.

(3)Bridging contact bonding via conducting bolt and nut. Silicone compound sealing, (Ref. Fig. 010) See Detail B.

(a)For dry areas and where equipment may be frequently removed, smear prepared surfaces with special material (Material No. 04-012), assemble equipment and torque load fasteners.

(b)Apply a film of special material (Material No. 04-012) to bared areas and check resistance (Refer to Para. 5.).

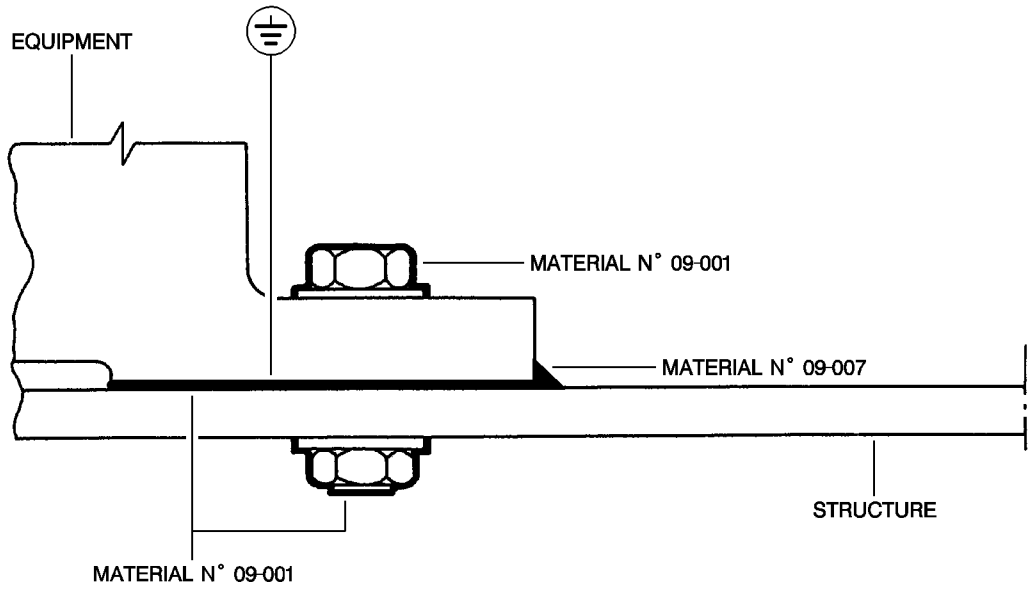
NOTE : Where more than two thicknesses are assembled, protective treatment on the intermediate faces may be removed. Apply a film of special material (Material No. 04-012) to bared surfaces before assembly.

(4)Bonding - using lead assembly (Ref. Fig. 011)

(a)Remove protective treatment and clean equipment in accordance with Para C ensuring that the prepared area extends beyond the point of bonding by 0.04 - 0.12 in. (1.0 - 3.0 mm).

(b)Assemble the leads and fasteners, torque load and check resistance (Refer to Para. 5.).

(c)Overseal head of bolt, washer, cable tags and nut assembly using



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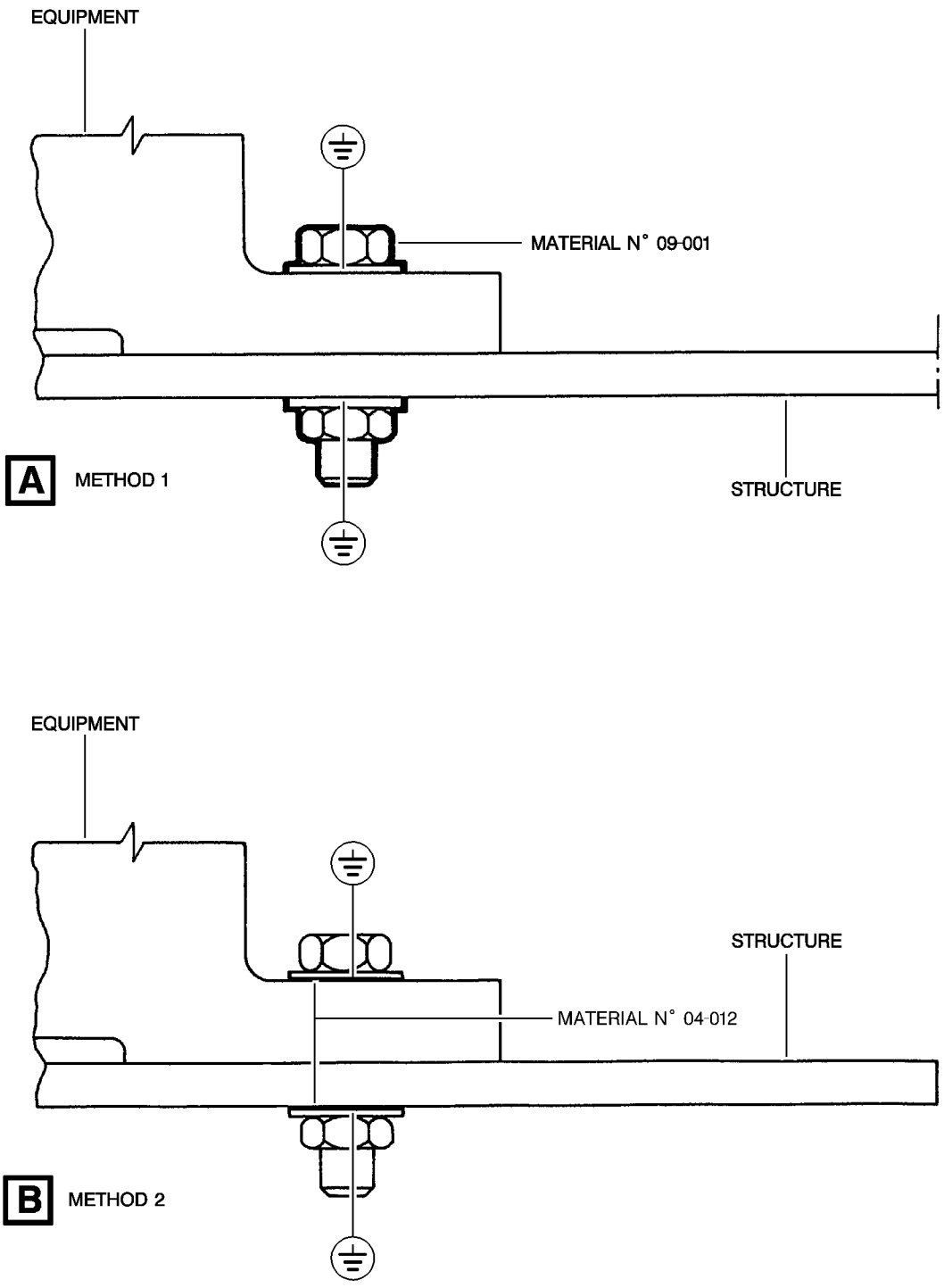
Bonding by Direct Contact
Figure 009



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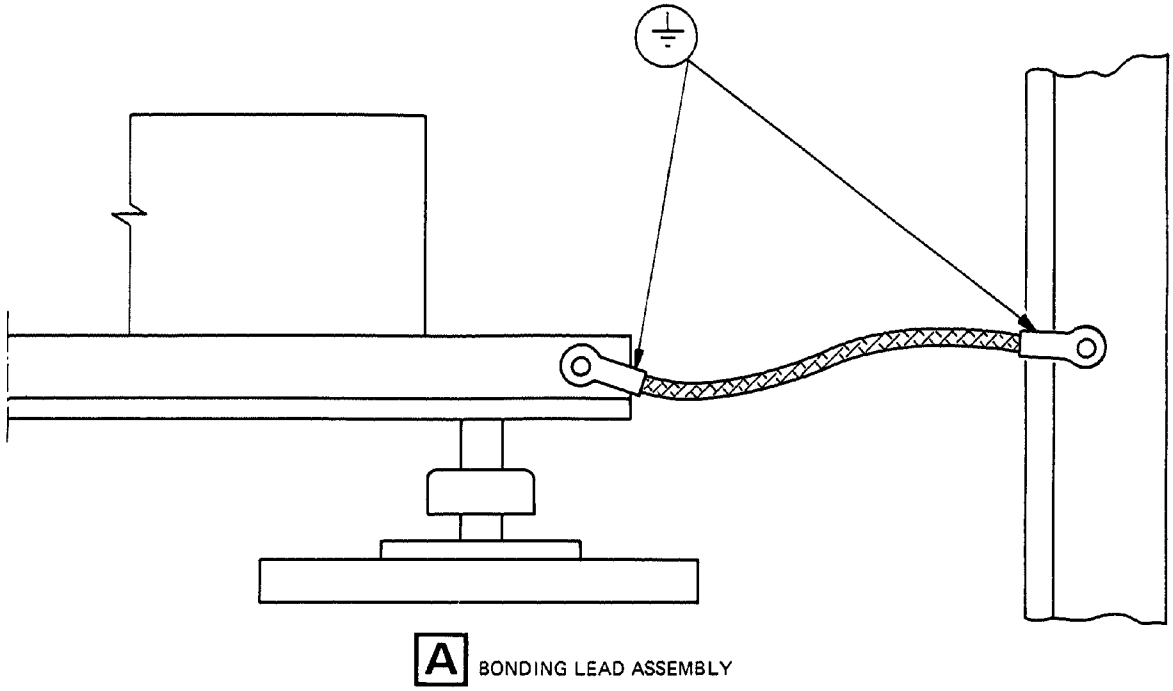
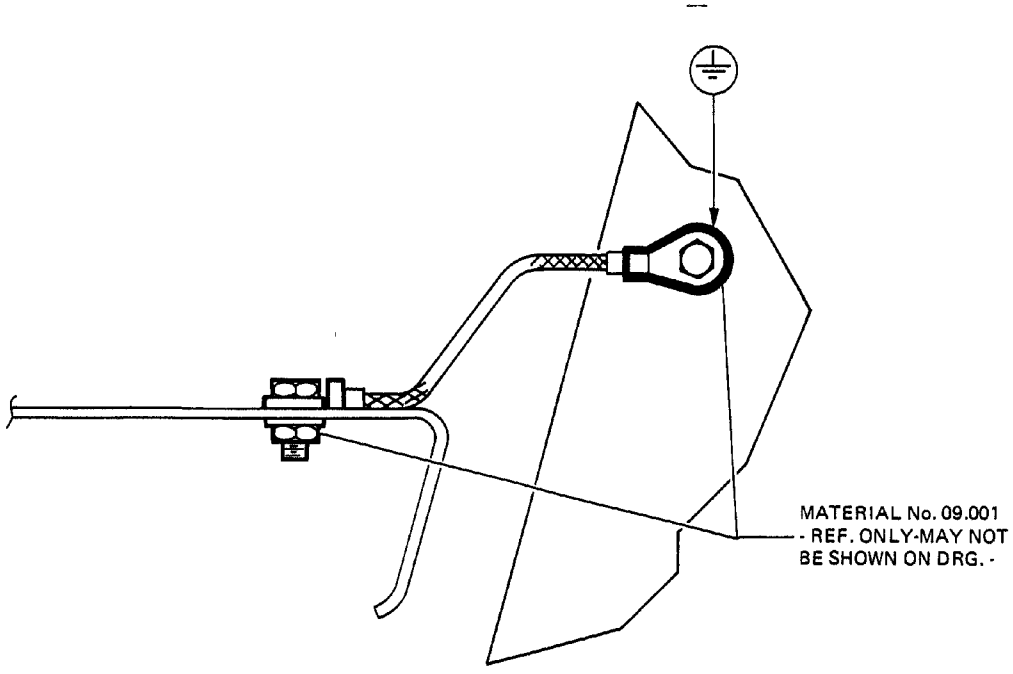
Bridging Contact Bonding
Figure 010

R



A BONDING LEAD ASSEMBLY



B GROUND RETURN - BONDING LEAD INSTALLATION

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Bonding Using Lead Assembly
Figure 011

sealant (Material No. 09-001) to ensure exclusion of moisture from unprotected surfaces and to overlap existing protective treatment.

NOTE 1 : For static parts:
Make certain that the bonding leads are as short and straight as possible without twists.

NOTE 2 : For moving parts:
Make certain that bonding leads have the appropriate length and cause no strain when the parts move. Install them without twist.

(d)Where equipment is in a dry area and may frequently be removed, leads and fasteners may be assembled using special material (Material No. 05-001).

(5)Bonding - Fixed and Floating Clamp Blocks
(Ref. Fig. 012, 013)

(a)Remove protective treatment and clean equipment in accordance with Para.C ensuring that the prepared area of pipes and structure extends beyond the width of the clamp by 0.04 - 0.08 in. (1.0 - 2.0 mm) on either side.

(b)Assemble pipes and bonding strips into clamp blocks:

1 On fixed clamp blocks, pull the bonding strip down and under the block, secure with fasteners and torque load.

2 On floating clamp blocks, assemble free end of bonding strip and one end of bonding lead under the head of clamp securing bolt. Secure free end of bonding lead to structure.

3 Check the resistance (Refer to Para. 5.).

(6)Bonding pipe to pipe, using clips or lugs (Ref. Fig. 014)

R NOTE: This procedure is applicable to all fuel pipe materials if the
R clamp is made with the same material as the fuel pipe to which it
R will be connected.

(a)Remove protective treatment and clean equipment in accordance with Para.C ensuring that the prepared area of pipes extends beyond the width of the clips or lugs by 0.04 - 0.16 in (1.0 to 4.0 mm).

(b)Assemble clips to pipes and bonding leads between lugs or clips (as fitted) and secure with fasteners and torque load, check resistance (Refer to Para. 5.).

(c)Overseal head of bolt, washer, tag, lug and clip assemblies using sealant (Material No. 09-001) to ensure exclusion of moisture from unprotected surfaces and to overlap the existing protective treatment.

NOTE : Where corrosion resistant steel clips are used, assemble without sealant.

(7)Ground return - Assembly of terminals (Ref. Fig. 015)

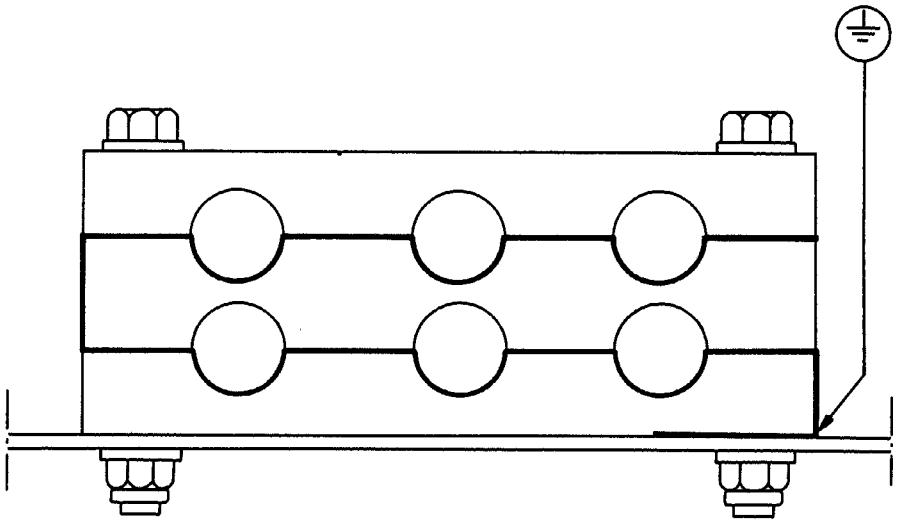
(a)Remove protective treatment and clean equipment in accordance with Para.C.

(b)Ensure surfaces are satisfactory then immediately assemble terminal.

(c)Repair any bared areas extending beyond area of terminal using appropriate paint touch-up scheme for aircraft and area concerned.

(d)Overseal terminal assembly using sealant (Material No. 09-001), to ensure exclusion of moisture from unprotected surfaces.

(e)Test the resistance (Refer to Para. 5.).



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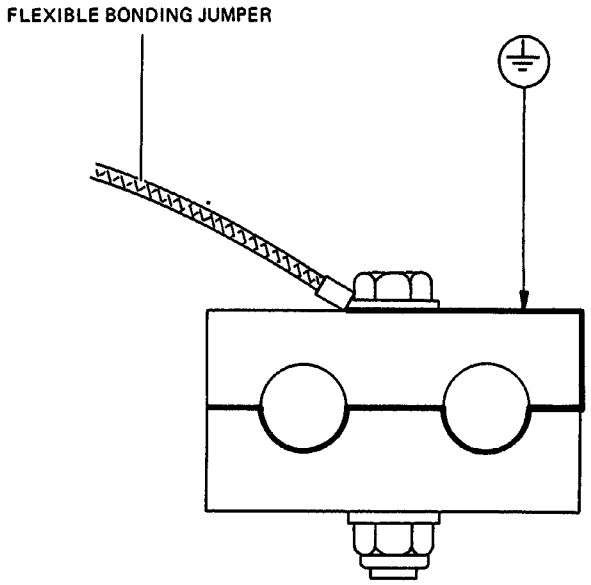
Bonding - Fixed Clamp Blocks
Figure 012



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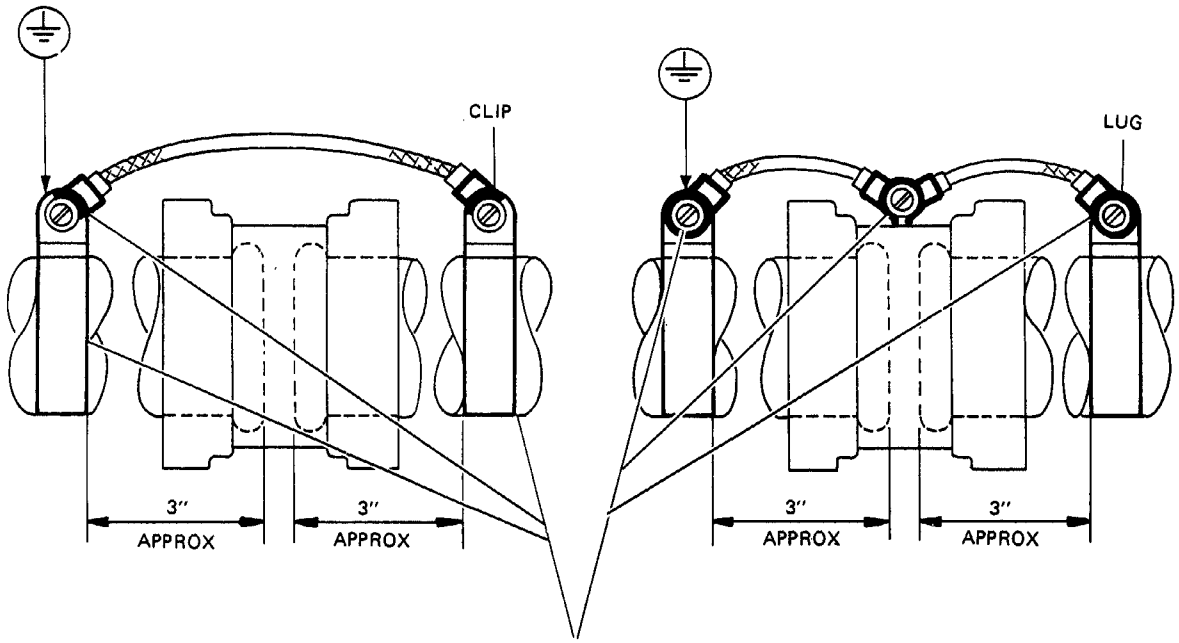
Bonding - Floating Clamp Blocks
Figure 013



MATERIAL No. 09.001 TO COMPLETELY COVER AREAS BETWEEN THICK LINES
—REF ONLY, MAY NOT BE SHOWN ON DRAWING

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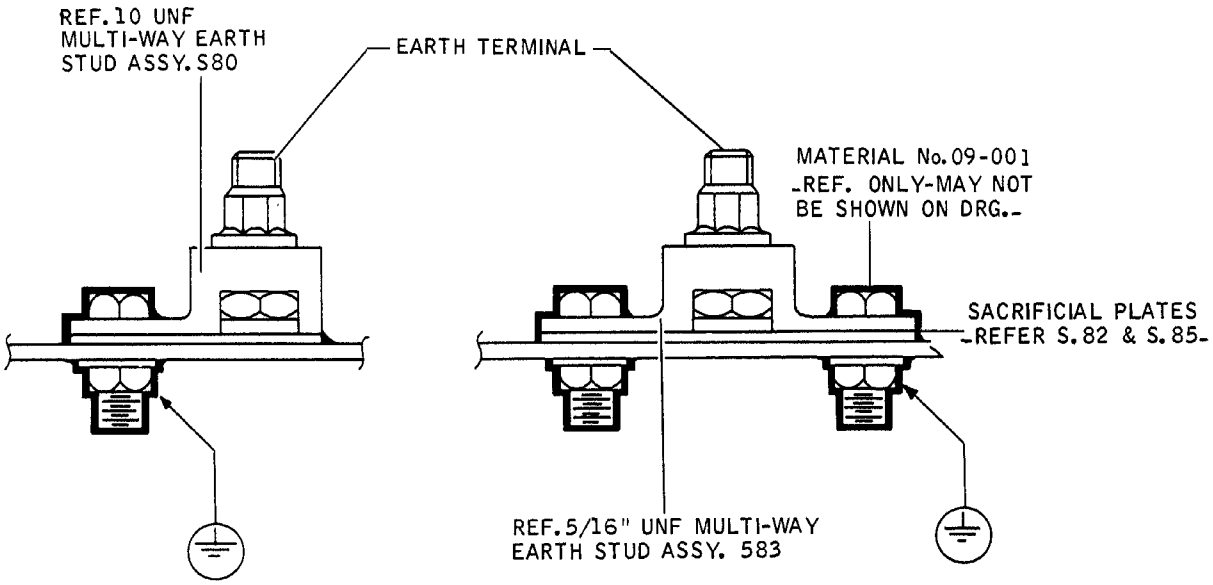
Bonding Pipe to Pipe
Figure 014



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Assembly of Ground Terminals
Figure 015

E. Inspection
(1)In accordance with requirements of the foregoing procedures, check that:
(a)The cleaning of surfaces and assembly of bonding points is satisfactory.
(b)The bonding point has been correctly protected.
(c)The final protective treatment has been correctly applied on completion of bonding and resistance checks.

4. Electrical Bonding Procedures for External Composite Components

WARNING : USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY WITH A GOOD FLOW OF AIR THROUGH THE WORK AREA.
THESE MATERIALS ARE POISONOUS AND FLAMMABLE AND SKIN IRRITANTS.
OBEY THE MANUFACTURERS INSTRUCTIONS.
PUT ON PROTECTIVE CLOTHING.
DO NOT GET THEM IN YOUR MOUTH.
DO NOT SMOKE.
DO NOT BREATHE THE GAS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

A. Introduction
The antistatic coats are designed to conduct the electro-static charges from non-conductive external surfaces to the aircraft metallic structure. Antistatic coats are used on non-conductive parts, composite parts, GFRP (Glass Fiber Reinforced Plastic) and AFRP (Aramid).
NOTE : CRFP (Carbon) parts do not require anti-static paints.
For radomes or antenna fairings, a high electrical resistance paint is required: This ensures a correct outflow of electro-static charges without downgrading the radio-electrical transparency of the antenna cover.

B. Assembly Operation
Electrical bonding points on composites are made as follows:
- Carbon composites: (Ref. Fig. 016)
  Areas are masked before application of all coatings (primer, top coat).
- Non-conductive composites: (Ref. Fig. 017)
  Areas are masked before application of anti-static paint and before application of any other coating.

For each electrical bonding point, the masked surface must be greater than the cup washer contact surface. Overlap must be + 4 mm max
+ 2 mm min.

(1)Equipment and materials

ITEM	DESIGNATION
(1)Material No. 04-012	Common Greases (Ref. 20-31-00)
(2)Material No. 07-001	Lacquers (Ref. 20-31-00)
(3)Material No. 09-001	Sealants (Ref. 20-31-00)
(4)Material No. 11-004	Cleaning Agents (Ref. 20-31-00)
(5)	Lint Free Cloth

(2)Remove any sign of grease or oil with a lint free cloth made moist with

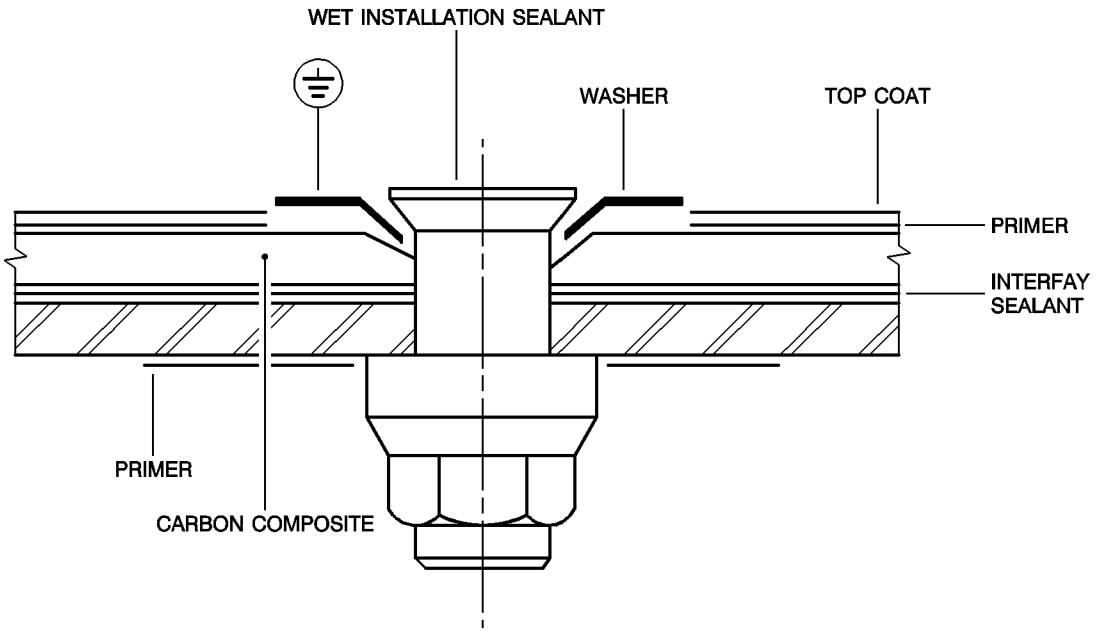
Cleaning Agents (Material No. 11-004).
(3)The following operations must be performed within a quarter of an hour following stripping.
(4)On protected light alloys:
(a)Apply a thin film of common grease (Material No. 04-012) on stripped areas.
(b)Degrease to remove excess vaseline after assembly with Cleaning Agents (Material No. 11-004).
(c)Apply lacquers (material No. 07-001) on fastener heads (at least on edge) and on stripped areas. In the specific case of clamps, lacquers (material No. 07-001) used for the piping must be applied to areas without insulation protection and on the surface of the clamps.
(5)On painted stainless steels:
(a)Apply lacquers (material No. 07-001) on fastener heads (at least on edge) after assembly and on stripped areas or areas masked for painting.
NOTE : For electrical bonding points which also perform a sealing function (fuel, air area, etc.), lacquers (material No. 07-001) will be replaced by a sealant (material No. 09-001).

5. Table of Maximum Permissible Resistance Values

A. Table of Maximum Resistance Values
(1)Primary structure
(a)The values given are for measurement between the primary metal structure of frame 1 and a metal part of the points that follow:

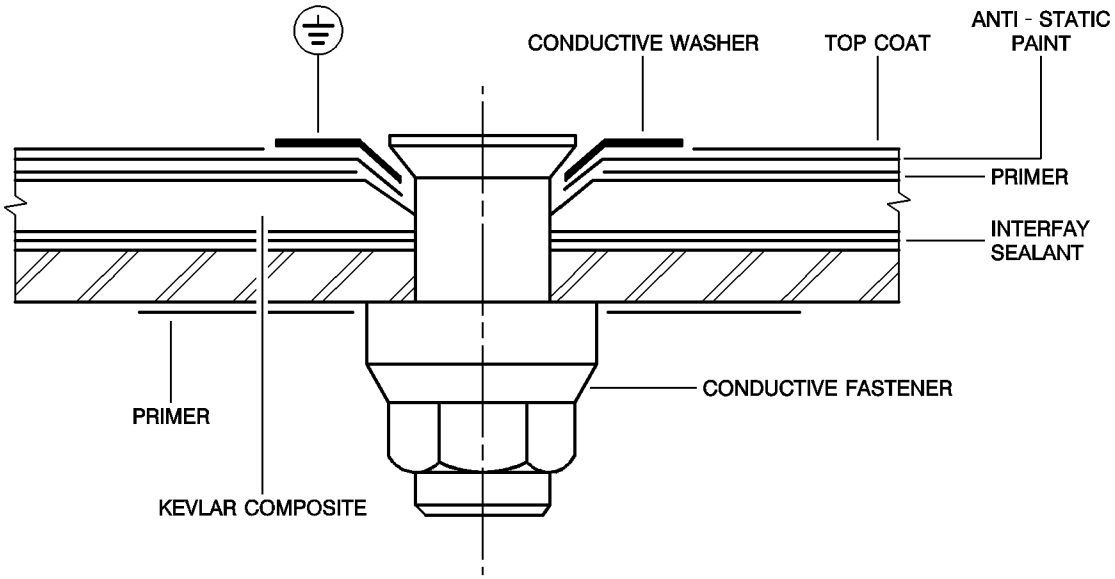
POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- end of the wing	Refer to para. 6.B.	2 milliohms
- end of the rear fuselage	Refer to para. 6.B.	2 milliohms
- end of the THS	Refer to para. 6.B.	5 milliohms
- lower part of the vertical stabilizer	Refer to para. 6.B.	5 milliohms
- engine structure	Refer to para. 6.B.	2 milliohms
- APU structure	Refer to para. 6.B.	2 milliohms

(2)External metal surfaces/parts (hinged or fixed)
(a)The values given are for measurement between the adjacent primary metal structure and a metal part of the points that follow:



BM5 20 28 11 0 CBM0 00

Assembly Operation on Carbon Composites
Figure 016



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Assembly Operation on Non-Conductive Composites
Figure 017

	POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
R	- doors and access doors/panels	Refer to para. 6.B.	10 milliohms *
R	- lights	Refer to para. 6.B.	10 milliohms *
R	- vent holes and drain masts	Refer to para. 6.B.	10 milliohms *
R	- external linkages	Refer to para. 6.B.	10 milliohms *
R	- engine air intakes	Refer to para. 6.B.	10 milliohms *
R	- nacelle doors and panels	Refer to para. 6.B.	10 milliohms *
R	- engine and APU drains	Refer to para. 6.B.	10 milliohms *
	* 100 milliohms for stainless steel or titanium material		
R	- landing gear legs	Refer to para. 6.B.	100 milliohms
R	- spoiler, flap, aileron and slat mobile hinges	Refer to para. 6.B.	10 milliohms
R	- flap and slat on the tracks	Refer to para. 6.B.	50 milliohms
R	- end (fuselage side) of each radome lightning arrestor strip	Refer to para. 6.B.	2 milliohms
R	- pitot probes, angle of attack sensors and temperature probes	Refer to para. 6.B.	5 milliohms
R	- ice detector probes	Refer to para. 6.B.	10 milliohms
R	- radio and navigation antennas	Refer to para. 6.B.	5 milliohms
R	- HF coupler (make sure that the connectors are disconnected)	Refer to para. 6.B.	5 milliohms
R	- lightning arrestor strips at the periphery of the landing gear doors	Refer to para. 6.B.	50 milliohms
R	- MLG and NLG doors (metal)	Refer to para. 6.B.	50 milliohms
R	- landing gear uplock	Refer to para. 6.B.	500 milliohms
R	- landing gear door actuators	Refer to para. 6.B.	500 milliohms
R	- servocontrols	Refer to para. 6.B.	50 milliohms

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- pylon rear structure	Refer to para. 6.B.	2 milliohms
- fan cowl hinges	Refer to para. 6.B.	10 milliohms

(3)Fluid systems
(a)The values given are for measurement between the adjacent primary metal structure and a metal part of the points that follow:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
Fuel system and systems in fuel vapor zones		
- electrical components (inside or outside fuel tanks)	Refer to para. 6.C.	10 milliohms
- non-electrical components outside fuel tanks	Refer to para. 6.C.	50 milliohms
- non-electrical components inside fuel tanks	Refer to para. 6.C.	10 milliohms
- stainless steel pipes	Refer to para. 6.C.	100 milliohms
- light alloy pipes	Refer to para. 6.C.	10 milliohms
Hydraulic system		
- electrical components	Refer to para. 6.C.	50 milliohms
- non-electrical components, length more than 200 mm (7.87 in.)	Refer to para. 6.C.	500 milliohms
- pipes (all materials), length more than 1 m (3.28 ft.)	Refer to para. 6.C.	500 milliohms
Air system		
- electrical components	Refer to para. 6.C.	50 milliohms
- non-electrical components, length more than 200 mm (7.87 in.)	Refer to para. 6.C.	500 milliohms
- pipes (all materials), length more than 2 m (6.56 ft.)	Refer to para. 6.C.	500 milliohms

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
Oxygen system		
- stainless steel components	Refer to para. 6.C.	100 milliohms
- light alloy components	Refer to para. 6.C.	10 milliohms
Other fluid systems		
- electrical components	Refer to para. 6.C.	50 milliohms
- non-electrical components, length more than 200 mm (7.87 in.)	Refer to para. 6.C.	500 milliohms
- pipes (all materials), length more than 2 m (6.56 ft.)	Refer to para. 6.C.	500 milliohms
- engine fire extinguisher bottles	Refer to para. 6.C.	10 milliohms

(4)Electrical components
(a)The values given are for measurement between the adjacent primary metal structure and a metal part of the points that follow:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- electrical components not installed on rack and with bonding through the fasteners	Refer to para. 6.B.	10 milliohms
- electrical components with bonding through pin and cable :		
. static inverters	Refer to para. 6.B.	5 milliohms
. transformer/rectifiers	Refer to para. 6.B.	5 milliohms
. transformers 115/26V	Refer to para. 6.B.	5 milliohms
. all others	Refer to para. 6.B.	50 milliohms

R (5)Electrical Bonding of the High Lift System Components
R (a)Check of the electrical bonding of the high lift system electrical and
R hydraulic components (Refer to para. 6.B.)
R Make sure that the maximum permitted resistance value is less than
R 20 milliohms.

R (6)Racks and electrical equipment supports
(a)The values given are for measurement between the adjacent primary

metal structure and a metal part of the points that follow:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- main structure of racks	Refer to para. 6.B.	1 milliohm
- secondary structure of racks	Refer to para. 6.B.	10 milliohms
- aluminum grounding modules	Refer to para. 6.B.	1 milliohm
- stainless steel or titanium grounding modules	Refer to para. 6.B.	3 milliohms
- metal shelves	Refer to para. 6.B.	10 millihoms

R (7)Shielding conduits

(a)The values given are for measurement between the adjacent primary metal structure and a metal part of the points that follow:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- end of shielding conduits :		
DIA. between 9 and 12 mm (0.35 and 0.47 in.) :		
. length less than or equal to 1 m (3.28 ft.)	Refer to para. 6.B.	5 milliohms
. length more than 1 m (3.28 ft.)	Refer to para. 6.B.	10 milliohms
DIA. between 14 and 20 mm (0.55 and 0.78 in.) :		
. length less than or equal to 1.5 m (4.92 ft.)	Refer to para. 6.B.	5 milliohms
. length more than 1.5 m (4.92 ft.)	Refer to para. 6.B.	10 milliohms
DIA. between 24 and 32 mm (0.94 in. and 1.26 in.) :		
. length less than or equal to 2 m (6.56 ft.)	Refer to para. 6.B.	5 milliohms
. length more than 2 m (6.56 ft.)	Refer to para. 6.B.	10 milliohms
- boxes and support plates	Refer to para. 6.B.	5 milliohms

R (8)Cabin components and equipment

(a)The values given are for measurement between the adjacent primary metal structure and a metal part of the points that follow:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- main instrument panel, consoles, glareshield, center pedestal, overhead panel	Refer to para. 6.B.	10 milliohms
- VU panels	Refer to para. 6.B.	10 milliohms
- seat tracks	Refer to para. 6.B.	10 milliohms
- electrical equipment casing	Refer to para. 6.B.	50 milliohms
- protective covers and metal components (non electrical)	Refer to para. 6.B.	500 milliohms
- metal control components (pedals, handles, etc)	Refer to para. 6.B.	500 milliohms
- CAPT and F/O seats	Refer to para. 6.B.	80 milliohms
- CAPT and F/O seats with carbon base	Refer to para. 6.B.	150 milliohms
- Third Occupant seat tracks	Refer to para. 6.B.	10 milliohms
- Fourth Occupant seat vertical members	Refer to para. 6.B.	10 milliohms

R (9)Static dischargers

(a)The values given are for measurement between the metal part of the static dischargers and the metal part that follows:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- the adjacent A/C structures:		
. for the static dischargers installed on metal structures	Refer to para. 6.B.	50 milliohms
. for the static dischargers installed on composite structures	Refer to para. 6.D.	50 Kohms

(b)If you cannot get the resistance values on the static dischargers installed on composite structures:

1 Do a check of the surface electrical resistance of the antistatic coating of the related composite structure:

- if the surface resistance value is not correct:

Refer to SRM for repair of antistatic coating.
- if the surface resistance value is correct:
Do a check of the electrical bonding of the related composite structure.

R (10)Aircraft grounding
(a)The value given is for measurement between the metal plate below the wheel tires and the metal part that follows:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- landing gear leg	Refer to para. 6.G.	10 Megohms

R (11)External composite panels
(a)The values given are for measurement between the adjacent primary metal structure and the parts that follow:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- fairings (carbon composite or with antistatic coating) but not antenna fairings and radome	Refer to para. 6.E.	100 Kohms
- antenna fairings and radome	Refer to para. 6.E.	200 Megohms

R (12)Surface resistance of antistatic paint on external composite panels

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- fairings (but not antenna fairings and radome)	Refer to para. 6.F.	50 Kohms square resistance
- antenna fairings and radome	Refer to para. 6.F.	between 5 and 100 Megohms square resistance

R (13)Main grounding points and current return
(a)Main grounding points
1 The values given are for measurement between the adjacent metal structure of the grounding point and the upper end of the grounding lead of the equipment items that follow:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
- main batteries	Refer to para. 6.B.	1 milliohm
- transformer/rectifiers	Refer to para. 6.B.	1 milliohm
- AC generators	Refer to para. 6.B.	1 milliohm
- ground power receptacle	Refer to para. 6.B.	1 milliohm
- APU generator	Refer to para. 6.B.	1 milliohm
- static inverter	Refer to para. 6.B.	1 milliohm
- emergency generator	Refer to para. 6.B.	1 milliohm

(b)Secondary grounding points
1 The values given are for measurement between the adjacent metal structure of the grounding point and the upper end of the grounding lead:

POINT LOCATION	TASK REFERENCE	MAX. PERMITTED RESISTANCE VALUE
For cables with a gauge of not more than 20:		
- with a test current of 10 amperes:		
. steel, stainless steel and titanium material	Refer to para. 6.B.	1 milliohm
. other materials	Refer to para. 6.B.	0.1 milliohm
For cables with a gauge of more than 20:		
- with a test current of 1 ampere:		
. steel, stainless steel and titanium material	Refer to para. 6.B.	1 milliohm
. other materials	Refer to para. 6.B.	0.1 milliohm

6. Test Procedures

A. Low-Current Test Method
(1)Equipment
(a)Variable Power Supply Unit (PSU), continuous output test current of 10 amperes (24 volts nominal).
NOTE : The ratings of the wires that connect the PSU to the components on which you do the test must be:

- at least 25% higher than the maximum current used in the test
- for the low-current test, the wire rating = 13 amperes.

(b)Ammeter - FSD 10 amperes.
(c)Millivoltmeter - multirange.

RANGE	1	2	3	4	5
FSD	2mV	20mV	200mV	2V	20V

(2)Measurement of the Electrical Resistance
CAUTION : MAKE SURE THAT YOU DO NOT CAUSE DAMAGE TO THE EQUIPMENT OR THE STRUCTURE WHEN YOU USE SHARP-POINT PRODS.
CAUTION : MAKE SURE THAT THE TEST EQUIPMENT IS CORRECTLY INSTALLED BEFORE YOU MEASURE THE BONDING VALUES.
(a)Connect the PSU.
NOTE : Make all the connections as near as possible to the bonding or grounding point.
NOTE : Make sure that the connections are clean and have no grease.
(b)Adjust the PSU to get a test current of 10 amperes on the ammeter.
NOTE : Start with the PSU at its low setting.
(c)Put one prod of the millivoltmeter on the structure adjacent to the bonding point and the other prod on the component (put them adjacent to the bonding points and make sure that there is a good contact).
NOTE : Start the test with the millivoltmeter in the 20V range. Go down in sequence through the ranges to get the highest movement of the needle on the scale.
(d)Measure and write the values.
(e)Remove the prods, de-energize the power supply and disconnect the test circuit.
(f)Calculate the resistance in milliohms:
- divide the voltage in millivolts by the current in amperes.
(g)Make sure that the measured values are not higher than the maximum permitted values (Refer to para. 5.).
(3)Close-up
(a)Make sure that the work area is clean and clear of tools and other items.

B. Check of the Electrical Bonding of the Different Components (but not the Fluid Systems and the Components Installed on Composite Materials)
(1)Equipment and materials

ITEM	DESIGNATION
(a)	Milliohmmeter

(2)General
(a)This is the recommended procedure for the check of the electrical bonding of the different components (but not the fluid systems and the components installed on composite materials).
(b)As an alternative method, for test with an output test current of

10 amperes, you can use the low-current test method (Refer to para. 6.A.).

(3)Measurement of the electrical resistance

CAUTION : MAKE SURE THAT YOU DO NOT CAUSE DAMAGE TO THE EQUIPMENT OR THE STRUCTURE WHEN YOU USE SHARP-POINT PRODS.

CAUTION : MAKE SURE THAT THE TEST EQUIPMENT IS CORRECTLY INSTALLED BEFORE YOU MEASURE THE BONDING VALUES.

(a)Equipment

1 Milliohmmeter, multirange, with the related leads and prods:

a Range and output test current:

- 500 milliohms with an output test current of 1 ampere (for a max. resistance value of more than 200 milliohms),
- 200 milliohms with an output test current of 10 amperes (for a max. resistance value of not more than 200 milliohms).

b Accuracy:

- better than plus or minus 10 % of the measured value.

c For example: Milliohmmeter GUERPILLON type DIGITHOM 1998

(b)Connect the test equipment at the applicable locations (Refer to para. 5.).

(c)Measure the electrical resistance.

(d)Make sure that the measured values are not higher than the maximum permitted values (Refer to para. 5.).

(e)Remove the test equipment.

(4)Close-up

(a)Make sure that the work area is clean and clear of tools and other items.

C. Check of the Electrical Bonding of the Fluid Systems

(1)Equipment and materials

ITEM	DESIGNATION
(a)97F92003500000	Milliohmmeter-EXPL ATM
Referenced Procedures	
- 28-00-00, P. Block 301	Fuel-General
- 28-10-00, P. Block 301	Storage

(2)Preparation

(a)For test of fluid system components (not in the fuel tanks)

1 Equipment

a Milliohmmeter, with the related leads and prods:

- output test current: 0.1 amperes maximum
- range: 500 milliohms minimum
- accuracy: better than plus or minus 10 % of the measured value.

(b)For test of fluid system components in the fuel tanks

WARNING : BEFORE YOU DO WORK IN A FUEL TANK, MAKE SURE THAT YOU OBEY ALL THE SAFETY PROCEDURES. THIS WILL PREVENT INJURY TO PERSONS AND/OR DAMAGE TO THE AIRCRAFT.

WARNING : FOR TESTS IN THE FUEL TANKS, MAKE SURE THAT YOU USE AN INTRINSIC SAFETY MILLIOHMMETER WHICH:
- AGREES WITH THE LOCAL STANDARDS FOR INTRINSIC SAFETY,

AND,
- HAS AN OUTPUT TEST CURRENT OF NOT MORE THAN 0.1 AMPERES.
TEST CURRENTS HIGHER THAN 0.1 AMPERES CAN BE DANGEROUS.

1 Safety precautions
a Obey the safety procedures (Ref. 28-10-00, P. Block 301) and (Ref. 28-00-00, P. Block 301) when you do work in a fuel tank.

2 Equipment

R a Milliohmmeter-EXPL ATM.

(3)Measurement of the electrical resistance

CAUTION : MAKE SURE THAT YOU DO NOT CAUSE DAMAGE TO THE EQUIPMENT OR THE STRUCTURE WHEN YOU USE SHARP-POINT PRODS.

CAUTION : MAKE SURE THAT THE TEST EQUIPMENT IS CORRECTLY INSTALLED BEFORE YOU MEASURE THE BONDING VALUES.

(a)Connect the test equipment at the applicable locations (Refer to para. 5.).
(b)Measure the resistance values.
(c)Make sure that the measured values are not higher than the maximum permitted values (Refer to Para. 5.).
(d)Remove the test equipment.

(4)Close-up
(a)Make sure that the work area is clean and clear of tools and other items.

D. Check of the Electrical Bonding of the Different Components Installed on Composite Materials

(1)Equipment and materials

ITEM	DESIGNATION
(a)	Ohmmeter - 500 Kohms - 500 Volts - 1 mA (max.)

(2)Equipment
(a)Ohmmeter - 500 Kohms - 500 Volts - 1 mA (max.), with the related leads and prods.

(3)Measurement of the electrical resistance

CAUTION : MAKE SURE THAT YOU DO NOT CAUSE DAMAGE TO THE EQUIPMENT OR THE STRUCTURE WHEN YOU USE SHARP-POINT PRODS.

CAUTION : MAKE SURE THAT THE TEST EQUIPMENT IS CORRECTLY INSTALLED BEFORE YOU MEASURE THE BONDING VALUES.

(a)Connect the test equipment at the applicable locations (Refer to para. 5.).
(b)Measure the resistance values.
(c)Make sure that the measured values are not higher than the maximum permitted values (Refer to Para. 5.).
(d)Remove the test equipment.

(4)Close-up
(a)Make sure that the work area is clean and clear of tools and other items.

E. Check of the Electrical Bonding of External Composite Panels

(1)Check of the electrical bonding of external composite panels with a

CORAS resistivity - continuity test set

(a)Equipment and materials

ITEM	DESIGNATION
1 QB31B	Resistivity - Continuity Test Set
2 QB31B1	Resistivity - Continuity Test Set
3 5301-79-99ZZ-Z	Resistivity - Test Set

(b)General

1 This is the recommended procedure for the check of the electrical bonding of external composite panels with or without finish paint.

2 As an alternative method, and only if there is finish paint, you can do the check with a megohmmeter (Refer to para. 6.E.(2)).

(c)Check of the electrical continuity

1 Equipment

a The resistivity - continuity test set (QB31B) or resistivity - continuity test set (QB31B1) or resistivity - test set (5301-79-99ZZ-Z) does a direct check of the electrical continuity between the antistatic paint on composite panels and the aircraft metal structure.

NOTE : You can do this check on panels with or without finish paint.

NOTE : Make sure that you obey the equipment manufacturer instructions when you use the resistivity - continuity test set.

2 Set the resistivity - continuity test set to mode C1.

3 Connect the ground lead between the resistivity - continuity test set and the adjacent primary metal structure.

4 Connect the lead of probe C1 to the resistivity - continuity test set.

5 Apply probe C1 to the panel.

6 Do the check:

a If the green indicator light comes on:
- there is electrical continuity with the structure and the resistance value is not more than 100 Kohms.

b If the orange indicator light comes on:
- there is electrical continuity with the structure and the resistance value is more than 100 Kohms and less than or equal to 200 Megohms.

c If the red indicator light comes on:
- there is no electrical continuity (or it is not sufficient) and the resistance value is more than 200 Megohms.

7 Remove the test set.

(d)Close-up

1 Make sure that the work area is clean and clear of tools and other items.

(2)Check of the electrical bonding of external composite panels (without non-conductive finish paint) with a megohmmeter

(a)Equipment and materials

ITEM	DESIGNATION
1	Megohmmeter 200 Megohms - 500 Volts - 1 mA (max.)
2	Ohmmeter 100 Kohms - 500 Volts - 1 mA (max.)

(b)General

1 The recommended method for the check of the electrical bonding of the external composite panels, with or without finish paint, uses a resistivity-continuity test set (Refer to para. 6.E.(1)).

2 This procedure gives an alternative method for the check of the electrical bonding of an external composite panel, only if there is no finish paint.

(c)Measurement of the electrical resistance

1 Equipment

a For fairings (but not the antenna fairings and the radome):

- Ohmmeter 100 Kohms - 500 Volts - 1 mA (max.), with 2 rounded-point prods, diameter 4 mm (0.1574 in.).

b For antenna fairings and radome:

- Megohmmeter 200 Megohms - 500 Volts - 1 mA (max.), with 2 rounded-point prods, diameter 4 mm (0.1574 in.).

2 Apply one prod on the composite panel:

- a minimum of 50 mm (1.9685 in.) (typical 100 mm (3.9370 in.)) from the edge of the panel and from the bonding point.

3 Apply the other prod to the adjacent primary metal structure near the panel.

4 Measure the resistance values:

- make sure that the measured values are not higher than the maximum permitted values (Refer to para. 5.).

5 Remove the test equipment.

(d)Close-up

1 Make sure that the work area is clean and clear of tools and other items.

F. Measurement of the Surface Electrical Resistance of External Composite Panels

(1)Measurement of the surface electrical resistance of external composite panels with a CORAS resistivity - continuity test set

(a)Equipment and materials

ITEM	DESIGNATION
1 QB31B	Resistivity - Continuity Test Set
2 QB31B1	Resistivity - Continuity Test Set
3 5301-79-99ZZ-Z	Resistivity - Test Set

(b)General

1 This is the recommended procedure for the measurement of the surface electrical resistance of an external composite panel with or without finish paint.

2 As an alternative method, and only if the antistatic paint is not

covered with a non-conductive finish paint, you can measure the resistance with an ohmmeter/megohmmeter (Refer to para. 6.E.(2)) or with conductive electrical tape (Refer to para. 6.F.(3)).

(c)Measurement of the surface electrical resistance

1 Equipment

a The resistivity - continuity test set (QB31B) or resistivity - continuity test set (QB31B1) or resistivity - test set (5301-79-99ZZ-Z) does a direct measurement of the surface electrical resistance of the antistatic paint on composite panels.

NOTE : You can do the measurement on panels with or without finish paint.

NOTE : Make sure that you obey the equipment manufacturer instructions when you use the resistivity - continuity test set.

2 Set the resistivity - continuity test set to mode R1.

3 Connect the lead of probe R1 to the resistivity - continuity test set.

4 Apply probe R1 to the panel.

5 Measure the resistance:

- make sure that the measured values are not higher than the maximum permitted values (Refer to para. 5.).

NOTE : If the red "dielectric" indicator light comes on:
- the surface electrical resistance is more than 200 Megohms.

6 Do the above steps again several times at different areas of the surface.

7 Remove the test equipment.

(d)Close-up

1 Make sure that the work area is clean and clear of tools and other items.

(2)Measurement of the surface electrical resistance of external composite panels (without non-conductive finish paint) with electrical conductive tape

(a)Equipment and materials

ITEM	DESIGNATION
1	Megohmmeter 100 Megohms - 500 Volts - 1 mA (max.)
2	Ohmmeter 50 Kohms - 500 Volts - 1 mA (max.)
3	3M Conductive Electrical Tape (X-1181-Copper or X-1170-Aluminum)

(b)General

1 The recommended method for the measurement of the surface electrical resistance of an external composite panel, with or without finish paint, uses a resistivity-continuity test set (Refer to para. 6.F.(1)).

2 This procedure gives an alternative method for the measurement of the surface electrical resistance of an external composite panel, only if there is no finish paint.

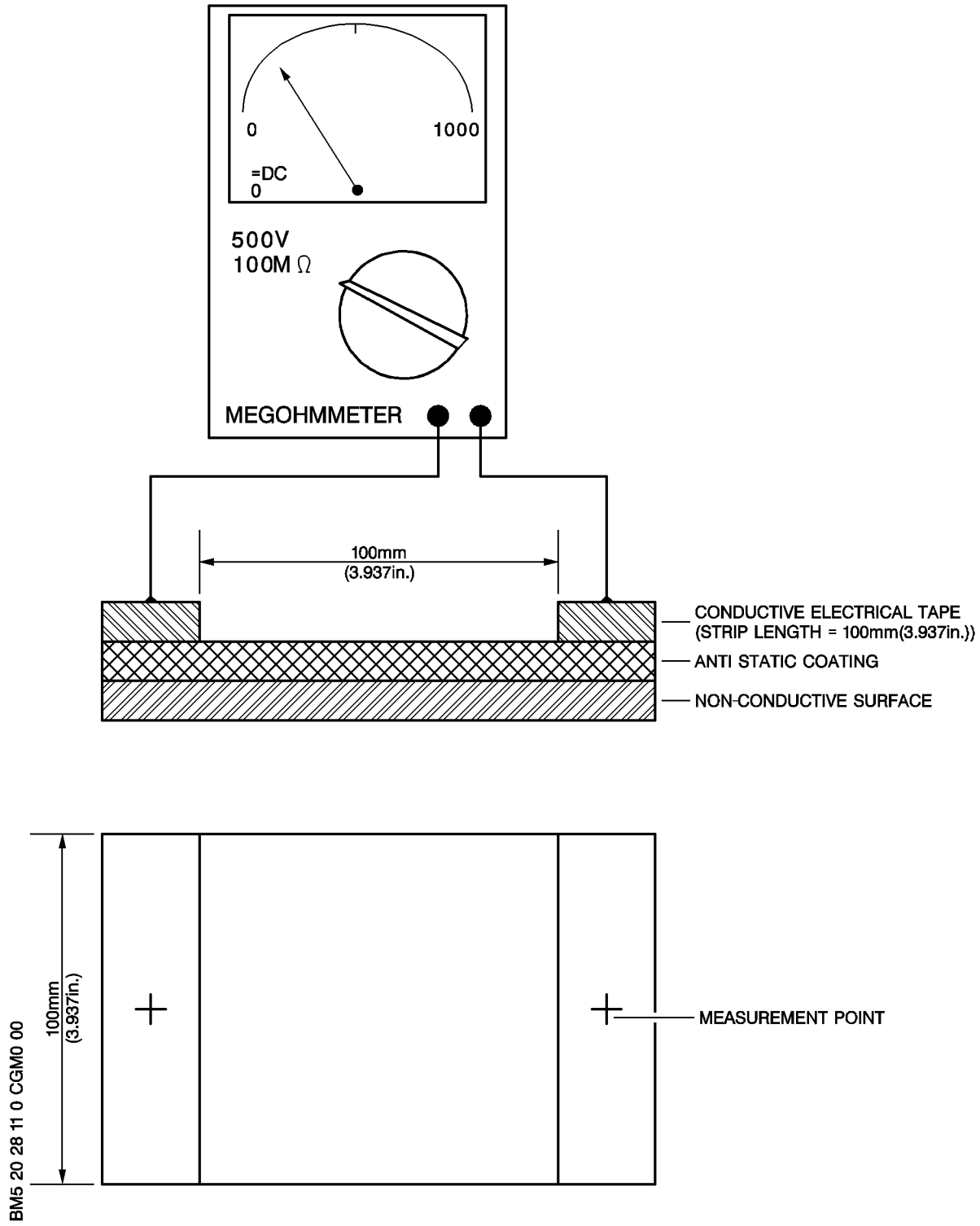
(c)Measurement of the surface electrical resistance

1 Equipment
a For fairings (but not antenna fairings and radome):
- Ohmmeter 50 Kohms - 500 Volts - 1 mA (max.), with 2 rounded-point prods, diameter 4 mm (0.1574 in.).
b For antenna fairings and radome:
- Megohmmeter 100 Megohms - 500 Volts - 1 mA (max.), with 2 rounded-point prods, diameter 4 mm (0.1574 in.).
c 3M conductive electrical tape (X-1181-Copper or X-1170-Aluminum).
2 On the surface, apply two parallel strips (100 mm (3.9370 in.) length) of 3M conductive electrical tape, 100 mm (3.9370 in.) apart, to make a square (Ref. Fig. 018).
3 Apply a prod of the ohmmeter/megohmmeter on each strip, and read the square resistance value.
4 Make sure that the measured values are not higher than the maximum permitted values (Refer to para. 5.).
NOTE : Do steps 2 to 4 again several times at different areas of the surface.
5 Remove the test equipment.
6 Remove the electrical conductive tape strips.
(d)Close-up
1 Make sure that the work area is clean and clear of tools and other items.
(Ref. Fig. 018)

(3)Measurement of the surface electrical resistance of external composite panels (without non-conductive finish paint) with probes
(a)Equipment and materials

ITEM	DESIGNATION
1	Megohmmeter 100 Megohms - 500 Volts - 1 mA (max.)
2	Ohmmeter 50 Kohms - 500 Volts - 1 mA (max.)
3	Probe per DIN65181

(b)General
1 The recommended method for the measurement of the surface electrical resistance of an external composite panel, with or without finish paint, uses a resistivity-continuity test set (Refer to para. 6.F.(1)).
2 This procedure gives an alternative method for the measurement of the surface electrical resistance of an external composite panel, only if there is no finish paint.
(c)Measurement of the surface electrical resistance
1 Equipment
a For fairings (but not antenna fairings and radome):
- Ohmmeter 50 Kohms - 500 Volts - 1 mA (max.), with 2 rounded-point prods, diameter 4 mm (0.1574 in.).
b For antenna fairings and radome:
- Megohmmeter 100 Megohms - 500 Volts - 1 mA (max.), with 2 rounded-point prods, diameter 4 mm (0.1574 in.).
c Probe DIN65181.



Conductive Electrical Tape Installation
Figure 018

NOTE : You can use 2 rounded-point prods, diameter 4 mm (0.1574 in.) as an alternative to the DIN65181 probe.

2 Connect the probe to the ohmmeter/megohmmeter.

3 Apply the prod on the surface covered with the antistatic paint:
- the distance between the edge of the surface and the probe must be at least 50 mm (1.9685 in.) (typical 100 mm (3.9370 in.)).

NOTE : The pressure applied on the probe must be sufficient to prevent the oscillations of the ohmmeter/megohmmeter display.

4 Measure the square resistance value.

NOTE : For probes that have electrodes 100 mm (3.9370 in.) apart, you must multiply the measured value by 0.5 to get the square resistance value.

5 Make sure that the measured values are not higher than the maximum permitted values (Refer to para. 5.).

NOTE : Do steps 2 to 5 again several times at different areas of the surface.(Ref. Fig. 019)

6 Remove the test equipment.

(d)Close-up

1 Make sure that the work area is clean and clear of tools and other items.

G. Check of the Aircraft Electrical Grounding

(1)Equipment and materials

ITEM	DESIGNATION
(a)	metal plate
(b)	Megohmmeter - 10 Megohms - 500 Volts - 1 mA (max.)

(2)Equipment

(a)Megohmmeter - 10 Megohms - 500 Volts - 1 mA (max.), with the related leads and prods.

(b)A metal plate.

(3)Measurement of the resistance value

(a)Put the metal plate between the tires of the nose landing gear and the ground.

(b)Measure the resistance between the plate and the nose gear leg with the megohmmeter.

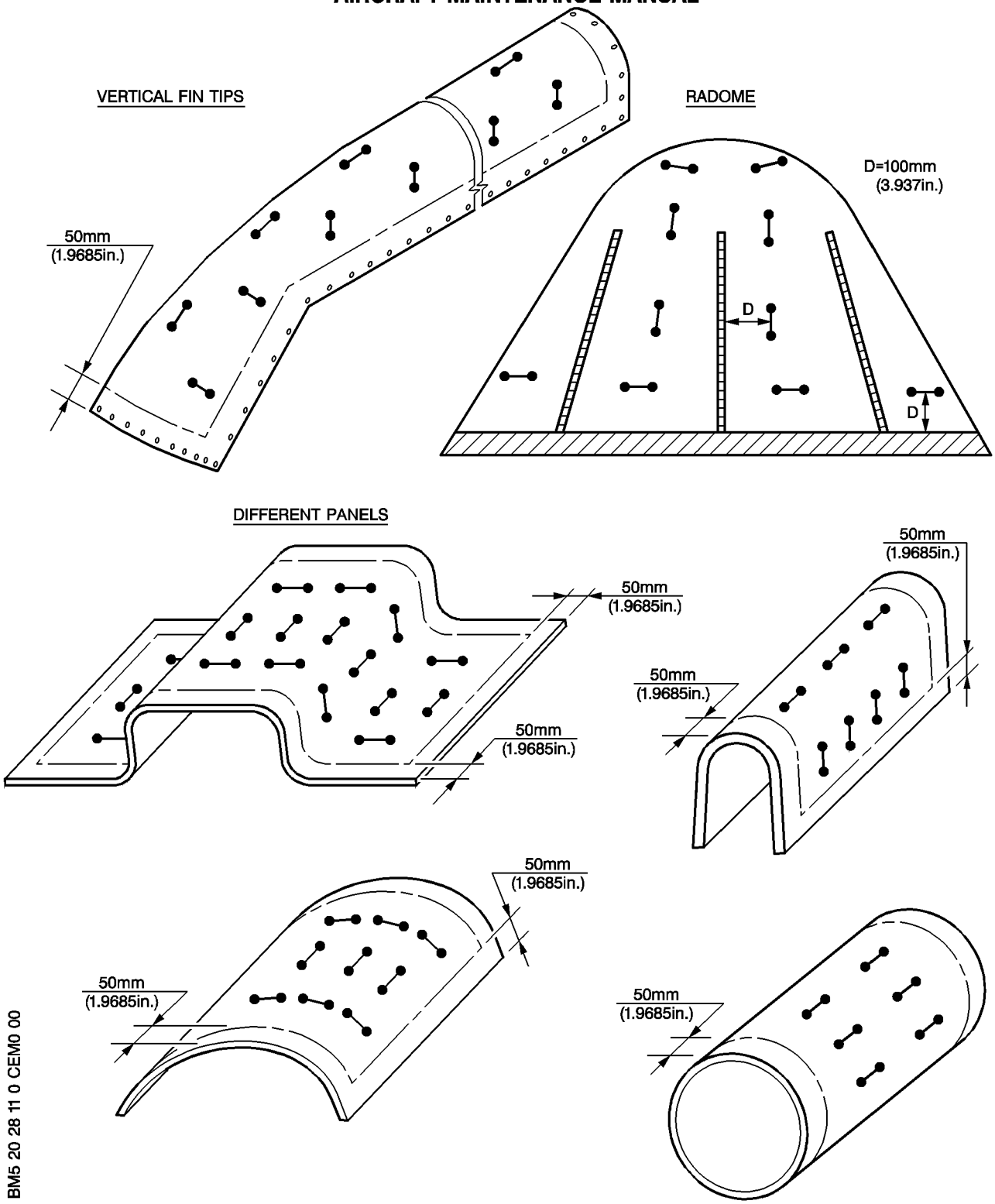
NOTE : This procedure is easier if you make the tire/plate contact moist.

(c)Make sure that the measured values are not higher than the maximum permitted values (Refer to Para. 5.).

(d)Remove the test equipment.

(4)Close-up

(a)Make sure that the work area is clean and clear of tools and other items.



Measurement Points on Different Panels
Figure 019

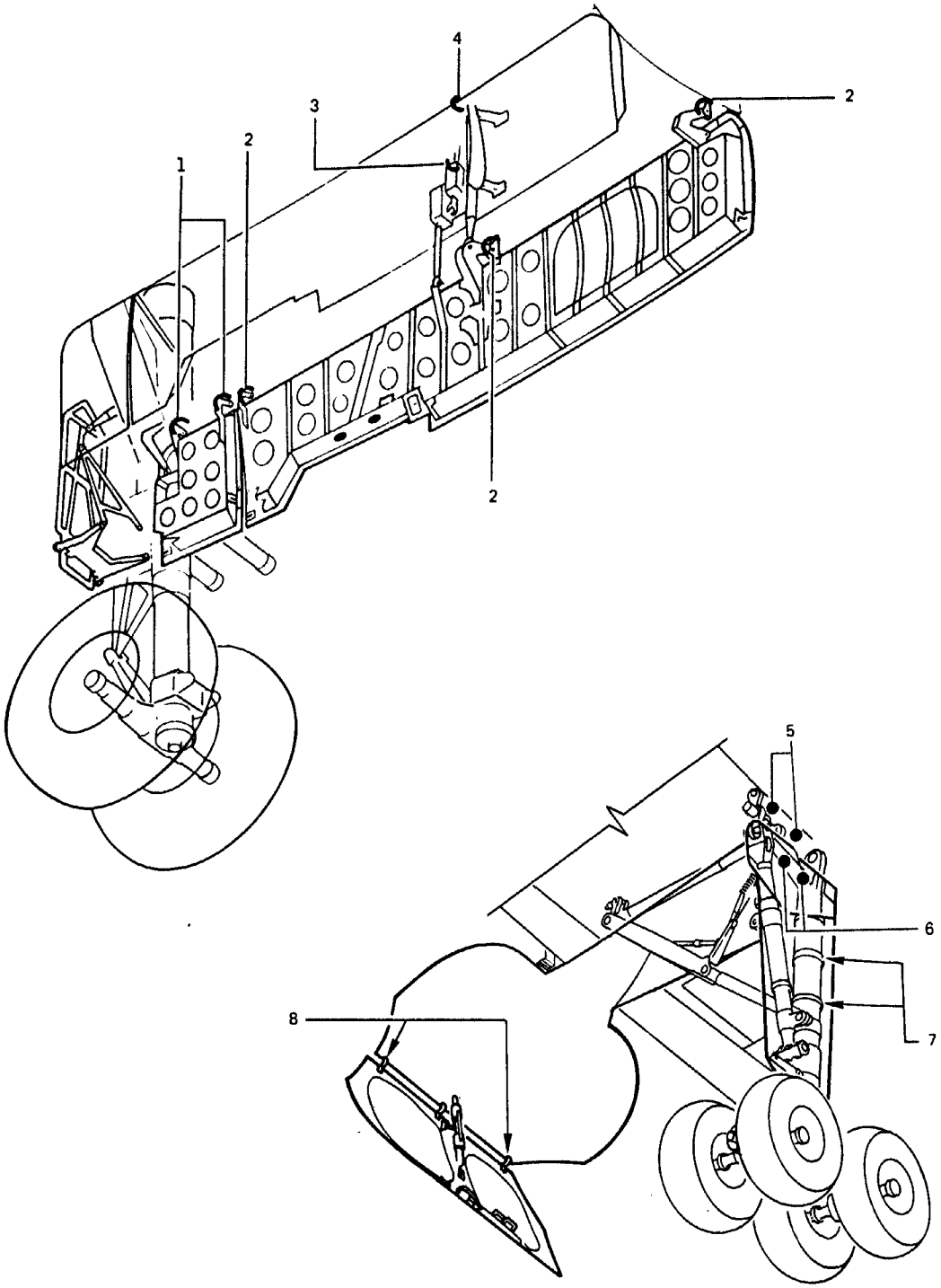
1. General
This subject provides the following information :

A. Bonding jumpers

R B. Aircraft grounding points (Ref. 24-00-00, P. Block 301).

2. Location of Bonding Jumpers on Landing Gear
(Ref. Fig. 001)

ITEM	BONDING SURFACES	BONDING JUMPER LOCATION	QTY PER A/C
1	Nose gear secondary door	Two door hinges-to-structure	4
2	Nose gear main door	Three door hinges-to-structure	6
3	Nose gear door uplock support rod	Rod-to-uplock mounting	2
4	Nose gear uplock support rod	Rod-to-structure	2
5	Main gear secondary door	Two door hinges-to-structure	2
6	Main gear secondary door	Door fittings-to-door	2
7	Main landing gear cylinder door	Door fitting-to-main gear shock strut	2
8	Main gear main doors	Two door hinges-to-structure	4



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Landing Gear - Electrical Bonding
Figure 001

SYSTEM CABLING

1. General

This section basically deals with the various procedures for cable installation and cable maintenance.

These various operations are subdivided as follows :

- 20-29-11 - Cable installation
- 20-29-12 - Check of control cables
- 20-29-13 - Cable cleaning and application of protective finishes on cables.
- 20-29-14 - Control cable rejection criteria.

CABLE INSTALLATION

CAUTION : WHEN HANDLING CABLE, USE PROTECTIVE GLOVES.

1. General

The purpose of this topic is to provide general instructions on cable installation.
Instructions pertaining to a specific installation are contained in the chapter which deals with the function performed.

2. Cleaning and Inspection

A. Equipment and Materials

ITEM	DESIGNATION
(1)Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
(2)Material No. 05-005	Special Materials (Ref. 20-31-00)
(3)	Lint-Free Cloth or Brush

B. Procedure

(1)Job Set-Up

(a)Prior to installation of a cable the following operations must be performed :
- cleaning
- Inspection

(2)Cleaning

NOTE : Use or lint-free cloth or brush dipped in Material No.11-003 to clean cables. Cables shall be left to dry, and anti-corrosive Material No. 05-005 applied.

CAUTION : DO NOT SATURATE CLOTH OR CABLES WITH SOLVENT SINCE SOLVENT PENETRATION TO CABLE CORE WASHES OUT LUBRICANT RESULTING IN RAPID WEAR AND CORROSION.

Carefully clean pulleys, fairleads, holes, etc., observing usual prescriptions.

(3)Inspection

(a)Supports

1 Check for evidence of :
- corrosion
- cracks
- distortion

2 Make certain that the supports are correctly secured to aircraft structure and check :
- screws, bolts and nuts for correct condition
- rivets for correct condition

(b)Pulleys

1 Check for evidence of :
- cracks
- fractures
- deep scoring
- distortion

2 Make certain that pulleys are correctly installed on associated mounting and check :
- spindles for correct condition
- safetying devices for correct condition

3 Make certain that the pulley can turn freely :
- without excessive play
- without any hard spot
- without jamming

(c)Fairleads

1 Check for evidence of heavy abrasion.

2 Make certain that they are correctly installed.

3. Installation of cables

A. General

When installing cable, check :
- cable condition
- alignment
- tension
- protective finish

B. Cable condition

Observe instructions given in Chapter 20-29-12.

C. Alignment

Make certain that there are neither loops nor excessive wear.

D. Tension

(1)Gradually adjust cable tension, making certain that there is no crossing of one cable over another.

(2)Make certain that cables are not twisted.

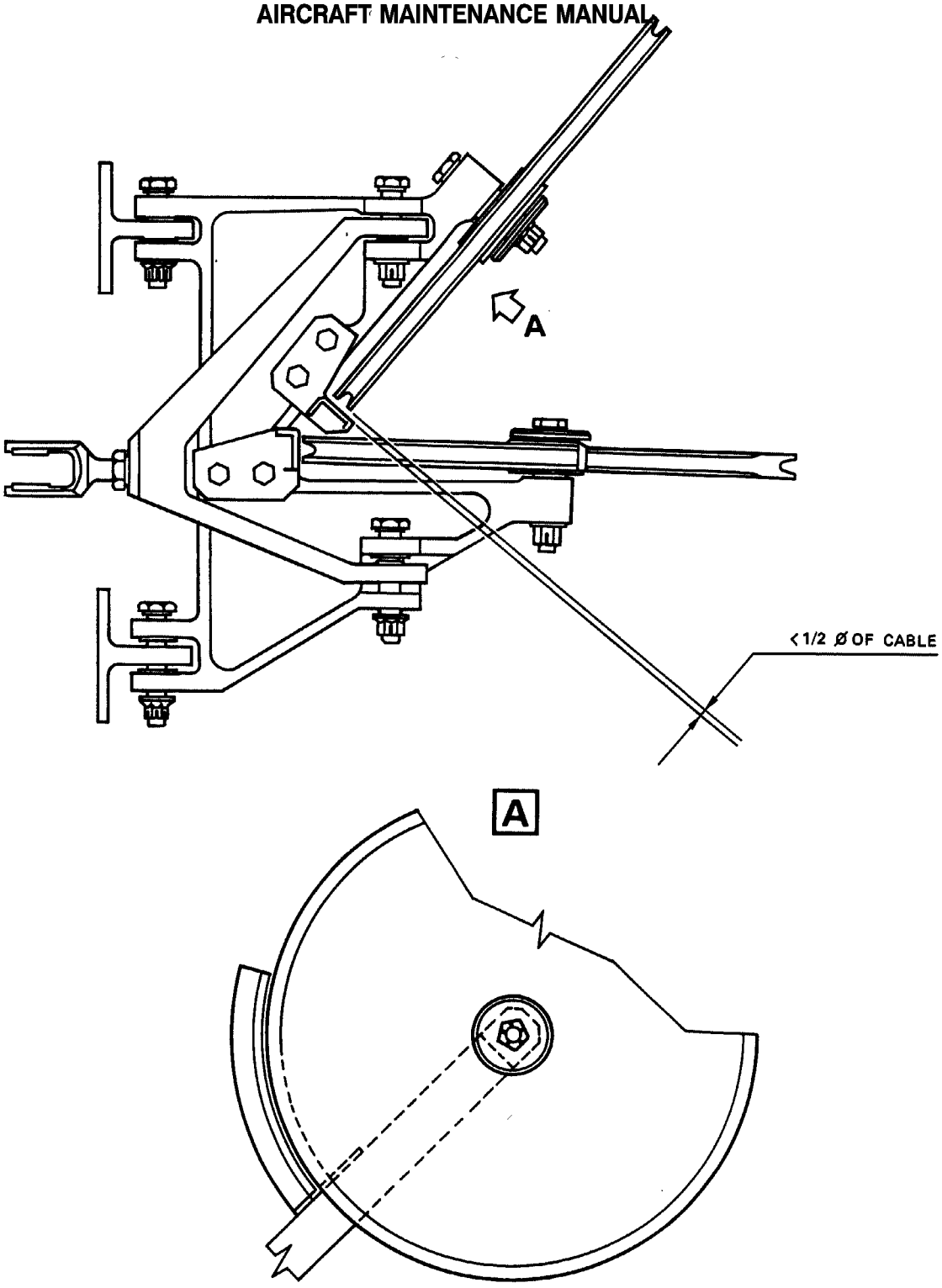
E. Protective finish

Observe instructions given in Chapter 20-29-13.

R 4. Installation of Pulley Cable Guard

R A. Clearance

R Adjust clearance between the outer diameter of the pulley and the guard
R inner face at a valve below 1/2 diameter of the cable.
R (Ref. Fig. 001)
R (Ref. Fig. 001)



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R

ASA Pulley Support Bracket
Figure 001

CONTROL CABLE CHECK

CAUTION : WHEN HANDLING CONTROL CABLES, USE PROTECTIVE GLOVES.

1. General

Control cables are in carbon steel or corrosion-resistant steel and may be of either flexible or non-flexible type construction.

A. Cable Definitions (Ref. Fig. 001)

The following terms define components used in control cables.

(1)Wire : Each individual cylindrical steel rod or thread.
(2)Strand : Each group of wires helically twisted or laid.
(3)Core : Tne central strand about which the remaining strands of the cables are helically laid.
(4)Cable : A group of strands laid helically about a core.

2. Control Cable Check

A. Cable Damage

(1)Critical areas for wire breakage are those sections of the cable which pass through fairleads and around pulleys.
(2)Examine cables for broken wires by passing a cloth along the length of the cable.
(3)Visual inspection will enable broken wires to be detected if cloth snags on cable.
(4)When snags are found, closely examine the cable to determine full extent of damage.
(Ref. Fig. 002)
NOTE : In the case of cables passing around pulleys or through fairleads, the number of broken wires must not exceed three wires per in. (25.4 mm) of cable working length.

B. External Cable Wear (Ref. Fig. 003)

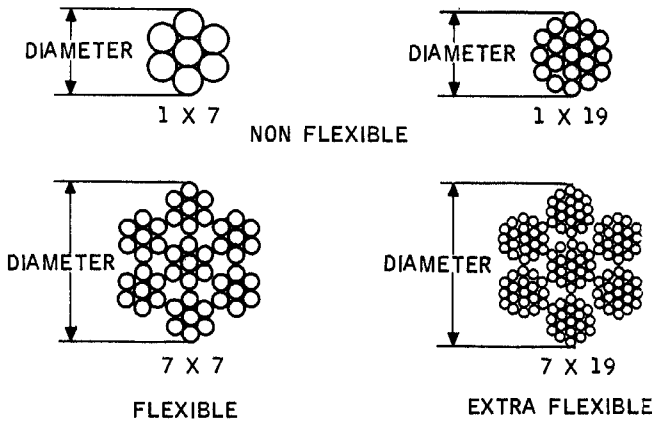
(1)Wear normally occurs along the working length of the cable either over a contact area at one side of the cable or around the cable periphery.
(2)Replace flexible and non-flexible cables when individual wires in each strand are worn 40-50 %.

C. Internal Cable Wear (Ref. Fig. 004)

(1)Internal cable wear occurs in the sections of cable which pass over pulleys and quadrants. This condition is not easily detected unless the strands of the cable are separated.
NOTE : Under unfavorable operating conditions internal cable wear can be greater than external cable wear.

D. Corrosion

(1)Carefully check for corrosion any cable that has a broken wire in a section not in contact with wear producing airframe components such as pulleys, fairleads, etc.
(2)It may be necessary to remove and flex the cable to properly inspect it for internal strand corrosion.



CABLE CROSS SECTION

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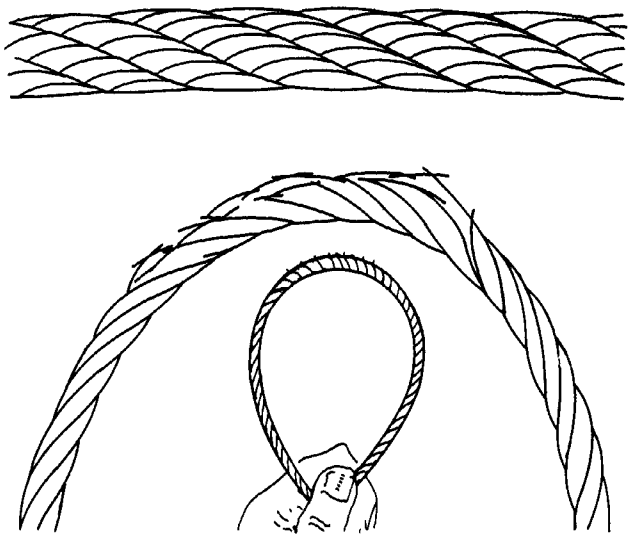
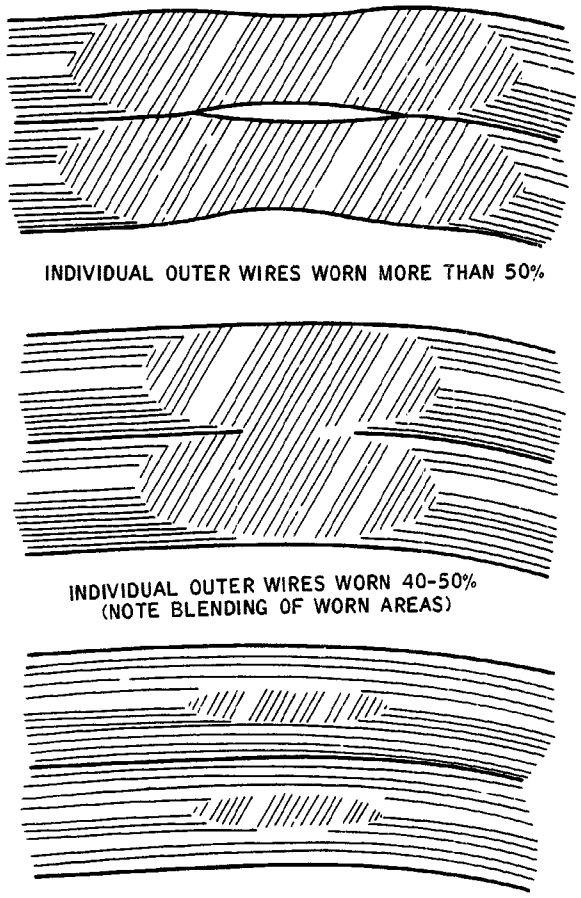
Cable Cross Section
Figure 001



Cable Inspection Technique
Figure 002


INDIVIDUAL OUTER WIRES WORN MORE THAN 50%
INDIVIDUAL OUTER WIRES WORN 40-50%
(NOTE BLENDING OF WORN AREAS)
INDIVIDUAL OUTER WIRES WORN LESS THAN 40%
(WORN AREAS INDIVIDUALLY DISTINGUISHABLE)

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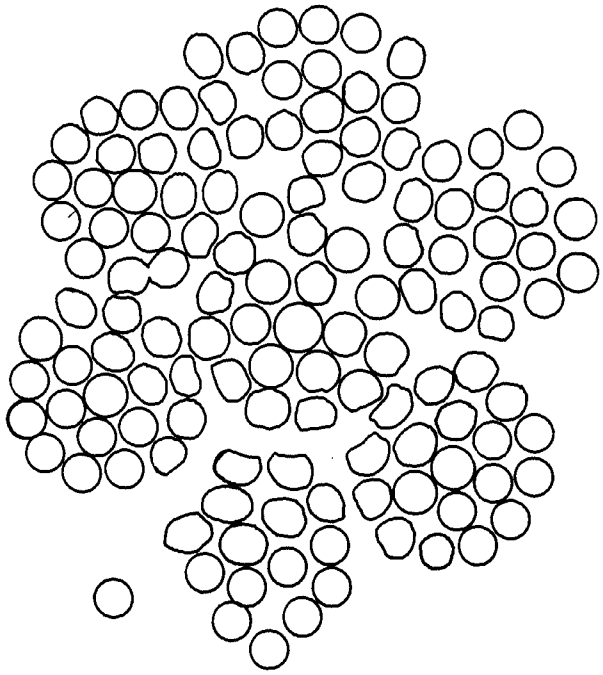
Cable Wear Patterns
Figure 003



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Internal Cable Wear
Figure 004

(3)Areas especially prone to cable corrosion are as follows :
  (a)Battery compartments
  (b)Lavatories
  (c)Landing gear wells
     NOTE : Usually those areas where concentrations of corrosive fumes, fumes, vapors, and liquids can accumulate.

CABLE CLEANING AND APPLICATION OF PROTECTIVE FINISHES ON CABLES

CAUTION : WHEN HANDLING CABLES, WEAR PROTECTIVE GLOVES.

1. General

This topic describes the procedure for applying corrosion-resistant protective finishes on carbon-steel cables.

2. Equipment and Materials

ITEM	DESIGNATION
A. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
B. Material No. 05-005	Special Materials (Ref. 20-31-00)
C.	Lintfree Cloth
D.	Brush
E.	Spray Gun (if necessary)
F.	Air Compressor (if necessary)
G.	Protective Gloves

3. Procedure

A. Job Set-Up

(1)Damper cloth with Material No.11-002 and wring out. Clean cable surface.

NOTE : Wringing out cloth will ensure that surplus cleaner will not penetrate to cable core, diluting the protective lubricant around each strand.

B. Application of Protective Finishes on Cables.

NOTE : Cables must be perfectly dry before Material No.05-005 is applied.

CAUTION : SINCE MATERIALS ARE FLAMMABLE, APPROPRIATE SAFETY PRECAUTIONS SHALL BE OBSERVED WHILE USING THEM.

(1)Material No.05-005 can be applied by spraying, brushing or dipping. Whichever process is adopted the following conditions shall be met:

(a)Ambient temperature must be between 5°C (41°F) and 35°C (95°F).

(b)When spray gun is used, air pressure must be at least 4 kg/cm2 (58psi)

(c)The thickness of the protective coat must be 0.05 mm(0.0020 in.).

(d)The protective film must be even over entire length without extra thickness areas due to drops or runs.

(e)Drying time is 1h30 to 2h00, according to the ambient temperature.

CONTROL CABLE REJECTION CRITERIA

WARNING : GLOVES SHALL BE WORN WHEN HANDLING CONTROL CABLES.

1. General

Control cable rejection criteria are as follows :

A. Outer wires worn 50%

B. Diameter increase beyond specified limits.

C. Broken wires in excess of specified limits.

D. Breakage of cable.

2. Equipment and Materials

ITEM	DESIGNATION
A. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
B. Material No. 05-005	Special Materials (Ref. 20-31-00)

3. Control Cables

A. General

Control cables in carbon or corrosion-resistant steel are of various type construction, as follows :

CLASS 1 x 19 (1 strand of 19 wires)
CLASS 7 x 19 (7 strands of 19 wires)
CLASS 7 x 7 (7 strands of 7 wires)

DIAMETER	CLASS	MATERIAL
1/8" (3.2 mm)	1 x 19	Carbon steel
1/8" (3.2 mm)	7 x 19	Carbon steel
R 3/32" (2.4 mm)	7 x 7	Corrosion-resistant steel

B. Cable System Inspection

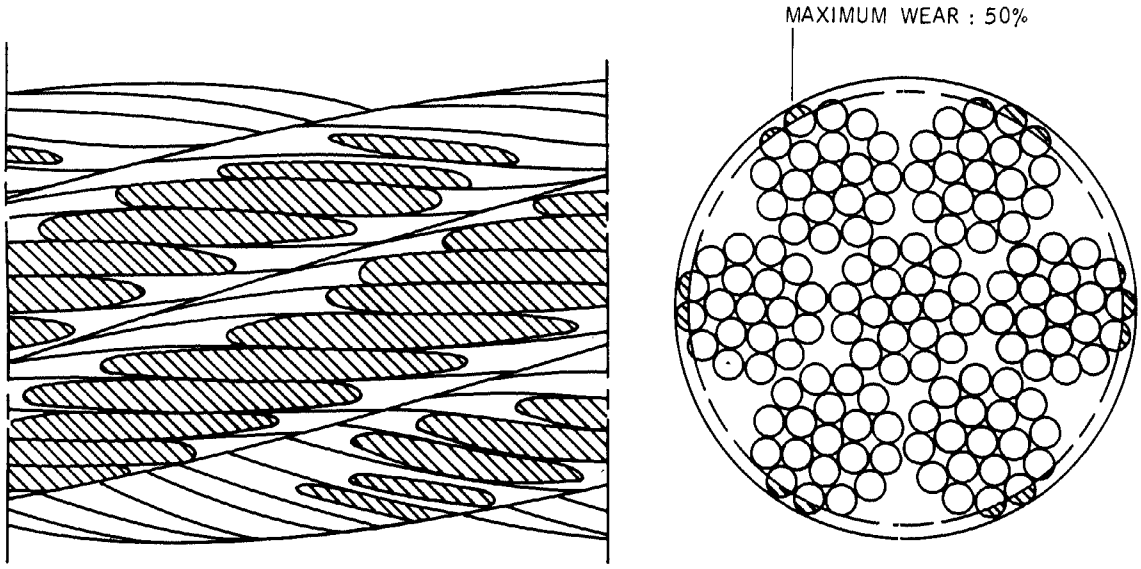
(1)Wear (Ref. Fig. 001)

R (a)Visually inspect cables for wear especially in those lengths of cables in contact with pulleys, fairleads or pressure seals.

(b)Permissible wear limits over a one inch (25.4 mm) length of cable, provided that there are no broken wires, are as follows :

- with a Class 7 x 19 cable, a maximum of 6 wires worn 50 percent or more of their diameter.
- with a Class 7 x 7 cable, a maximum of 3 wires worn 50 percent or more of their diameter.

R NOTE : The number of permissible worn wire in a same one-inch
R (25.4 mm) length of cable is decreased by one wire for
R every broken wire.
R A maximum of two one-inch (25.4 mm) lengths of cable with



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Cable Wear
Figure 001

R wear (within the limits specified above) is permissible on
R the total length of the cable (between the two cable terminals)
R on the condition that the wear is not on two consecutive
R one-inch (25.4 mm) lengths of cable.
R If a wire is worn to more than 60 percent of its diameter,
R you must call it a broken wire.

(2)Broken wires
(a)Check cables for broken wires by passing a cloth both ways along the length of the cable.
(b)Permissible limits for cables with broken wires are as follows :
- With a Class 7 x 19 cable, 6 broken wires over a length of one inch (25.4 mm) with a maximum of 3 broken wires per strand.
- With a Class 7 x 7 cable, over a length of one inch (25.4 mm) 3 broken wires with a maximum of 2 broken wires per strand.

R NOTE : There must not be broken wires in two consecutive one-inch
R (25.4 mm) lengths of cable.

R - With those lengths of cables which pass around pulleys or through fairleads and pressure seals a maximum of 3 broken wires is permissible
- Any non-flexible Class 1 x 19 cable with more than one broken inside
R wire in a 10 ft. (3.05 m) length of cable or in a length of cable
R which passes around a pulley or through a fairlead or pressure seal,
R shall be replaced.

(3)Corrosion
Check for corrosion especially on cable sections in contact with pulleys, fairleads and pressure seals.
- If any surface corrosion is found, carry out a more detailed inspection requiring cable slackening for inspection of inner strands
- Discard the cable if inner strand corrosion is found.

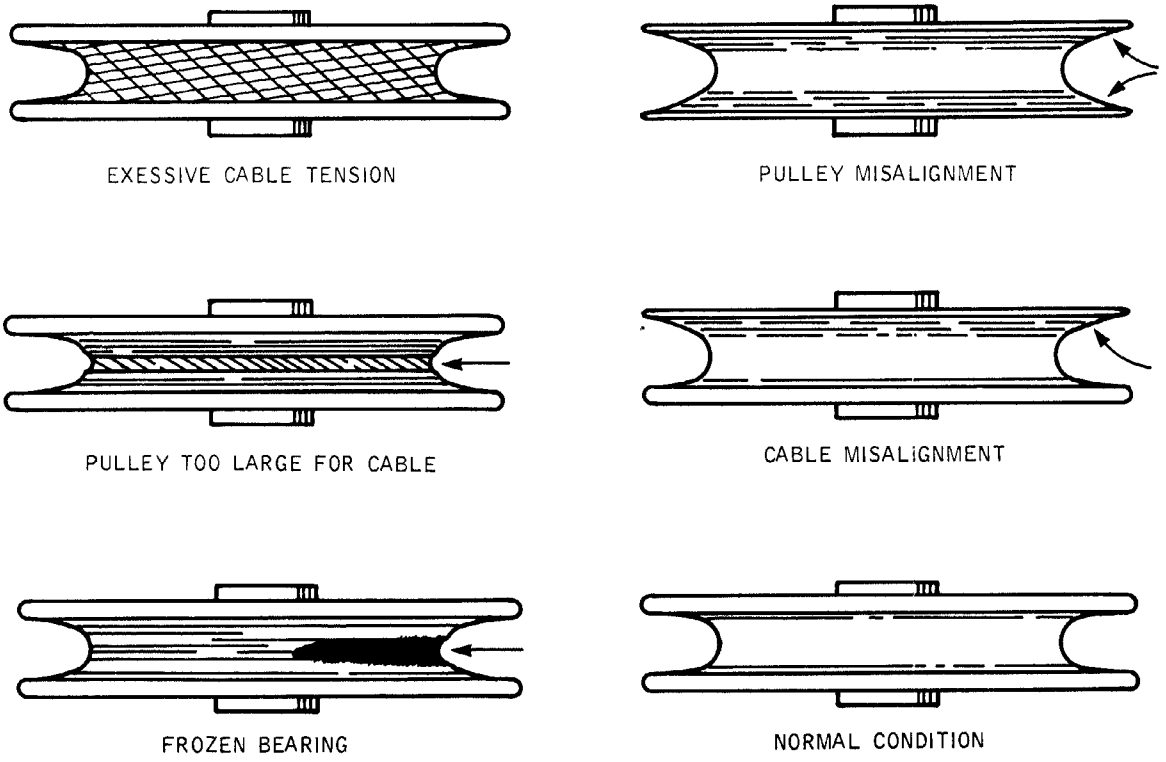
In case of minor corrosion :
Clean the cable using a brush or a lint-free cloth soaked with Material No.11.002 (Ref. 20-31-00)
- Allow to dry
- Apply anti-corrosion Material No.05.005 (Ref. 20-31-00) on cable.

4. Pulleys

A. General
The pulleys are made of fiber/resin and mounted on shielded bearings.

B. Visual Inspection
(1)Check condition of pulleys : (Ref. Fig. 002)
(a)Cracked edges
(b)Evidence of abnormal wear in bottom of groove
(c)Cracked hub.
(d)Blisters
(e)Excessive play in bearing or loose bearing.

C. Inspection During Operation Cycle
(1)Check that there are no hard spots when pulleys rotate.



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Pulley Wear Patterns
Figure 002

(2)Check that cable has not skidded on pulleys
(3)Visually inspect pulleys for roughness, sharp edges, and presence of foreign material embedded in the grooves.
(4)Visually inspect pulley wear pattern.
(5)Eccentricity check.

PULLEY MINOR DIAMETER	MAX. ECCENTRICITY AT TOP OF GROOVE	MAX. ECCENTRICITY AT BOTTOM OF GROOVE
≤ 1.181 in. (30 mm)	0.011 in. (0.30 mm)	0.005 in. (0.15 mm)
from 30 mm to < 3.149 in. (80 mm)	0.015 in. (0.40 mm)	0.007 in. (0.20 mm)
≥ 3.149 in. (80 mm)	0.019 in. (0.50 mm)	0.009 in. (0.25 mm)

(6)Run-out
(a)Check that sideways run-out of pulley per revolution does not exceed :
R 1 0.009 in. (0.25 mm) for pulleys below 3.15 in. (80 mm) diameter.
R 2 0.011 in. (0.30 mm) for pulleys of 3.15 in. (80 mm) diameter or
R above.
(7)Inspect pulley bearings to assure proper lubrication, smooth rotation, freedom from flat spots.
(8)Inspect pulley bolts for wear.
(9)Pulley is removed from service when any one of the following conditions exists :
- abnormal pulley wear pattern,
- excessive pulley wobble,
- failure to rotate freely and smoothly.

LIST OF MATERIALS REQUIRED FOR AIRCRAFT SERVICE AND MAINTENANCE

1. General

WARNING : BEFORE YOU USE A MATERIAL REFERRED TO IN THIS PUBLICATION, YOU MUST KNOW ALL OF THE APPLICABLE PRECAUTIONS.
THESE PRECAUTIONS TELL YOU HOW TO:
- USE THE MATERIAL SAFELY
- KEEP THE MATERIAL SAFELY
- DISCARD THE MATERIAL SAFELY.

READ THE SAFETY DATA SHEETS FROM THE MANUFACTURER OR THE SUPPLIER OF THE MATERIAL TO LEARN THE RECOMMENDED PRECAUTIONS.

WARNING : CONSUMABLE MATERIALS ARE USED IN ALL AREAS OF THE AIRCRAFT.
SOME OF THESE MATERIALS ARE HAZARDOUS MATERIALS.
BE CAREFUL WHEN YOU DO WORK WITH HAZARDOUS MATERIALS.
OBEY THE APPLICABLE PROCEDURES, PRECAUTIONS, RECOMMENDATIONS, WARNINGS AND CAUTIONS:
- WHEN YOU USE OR DO WORK WITH THESE MATERIALS,
- FOR THE STORAGE OF THESE MATERIALS,
- WHEN YOU DISCARD THESE MATERIALS.

HAZARDOUS MATERIALS CAN CAUSE INJURY OR ILLNESS IF YOU DO NOT USE THEM CORRECTLY.

CAUTION : WHEN YOU DO A MAINTENANCE TASK THAT USES COMMON GREASE, OBEY THESE PRECAUTIONS:
- IF POSSIBLE, USE ONLY GREASES OF THE SAME SPECIFICATION TYPE (IT IS PERMITTED TO USE DIFFERENT BRANDS IF THE SPECIFICATION TYPE IS THE SAME).
  WE SPECIALLY RECOMMEND THAT YOU DO NOT MIX GREASES THAT HAVE CLAY THICKENERS WITH GREASES THAT HAVE LITHIUM THICKENERS. SUCH A MIXTURE CAN CHANGE THE LUBRICATION PROPERTIES OF THE GREASE.
- IF YOU CANNOT OBEY THESE PRECAUTIONS AND YOU USE GREASES OF DIFFERENT SPECIFICATION TYPES (SPECIALLY THOSE WITH CLAY THICKENERS AND LITHIUM THICKENERS), DECREASE THE SERVICING INTERVALS (BY HALF, FOR EXAMPLE) SPECIFIED IN THE MAINTENANCE PLANNING DOCUMENT. DO THIS FOR APPROXIMATELY THREE OR FOUR SERVICES (REFER TO YOUR IN-SERVICE DATA TO FIND THE NUMBER OF SERVICES BEST ADAPTED TO YOUR AIRCRAFT).

A. Layout

This topic groups all materials used for aircraft operation, servicing, maintenance, repair and overhaul. They are classified according to their type: fuels, hydraulic fluids, oils, etc. Each category is covered by a specific paragraph: 1, 2, 3, etc. The following information is given for each material:
- Item Number
- Designation
- F, D, GB, USA Specifications are included, when applicable
- Specific or standard usage
- Nato (N) or USA (US) code or suppliers (COD. SPLR), Name and address of the suppliers can be found in the Consumable Materials List (CML).

The materials are called out in the following paragraphs:

- 1.	Fuels	Item No Starting from 01-001
- 2.	Hydraulic Fluids	Item No Starting from 02-001
- 3.	Oils	Item No Starting from 03-001
- 4.	Common Greases	Item No Starting from 04-001
- 5.	Special Materials	Item No Starting from 05-001
- 6.	Lubricants	Item No Starting from 06-001
- 7.	Lacquers	Item No Starting from 07-001
- 8.	Bonding and Adhesive Compounds	Item No Starting from 08-001
- 9.	Sealants	Item No Starting from 09-001
-10.	Anti-Icing and De-icing Materials	Item No Starting from 10-001
-11.	Cleaning Agents	Item No Starting from 11-001
-12.	Strippers	Item No Starting from 12-001
-13.	Pretreatment for painting	Item No Starting from 13-001
-14.	Disinfectants	Item No Starting from 14-001
-15.	Storage Preservation	Item No Starting from 15-001
-16.	Structure Paints	Item No Starting from 16-001
-17.	Microbiological Contamination Protection Materials	Item No Starting from 17-001
-18.	Extinguishing Agents	Item No. Starting from 18-001
-19.	Miscellaneous	Item No. Starting from 19-001

NOTE : 1/Materials specific to the engines are listed in topic 70-00-00.

2/The initials T.B.A. (To Be Added) indicate that information on the associated item will be added when available.

3/If there are several manufacturer references corresponding to a same specification, these ones will be replaced by the specification number followed by the term "OPEN".
Example: Greases (Elf aviation 22, Esso aviation 322, Mobil 28, Nyco 22, Aeroshell 22, ...) are covered by specification MIL-G-81322. The manufacturer references will be replaced by MIL-G-81322 OPEN.

4/The item number assigned to the material is given in the "ITEM" column.
Equivalent materials will be quoted, when available, under the same item number as the original material but identified by a suffix A, B, C, etc.
Any of the equivalent suffixed item numbers may be used in lieu of the basic item number.
But when a maintenance procedure calls up a material by item number with suffix, then only that material may be used.

B. Alphanumerical Index

	DESIGNATION	ITEM
R	ABS5093B	08-104A
R	ABS5662	08-073
R	ABS5725A	08-104A
	ACTIVATOR SPRAY	08-009B
	ADHESIVE GENERAL PURPOSE	08-006E
	ADSOL 120	08-027A
	AERFILM LHR-HA211 OR LHR-PS-LHR	05-074
	AERODUR ARC	07-003C
	AERODUR HF+HARD S66/22R + THIN C25/90S	16-039
	AERODUR NON SLIP	07-007
	AEROSHELL GREASE 33	04-037
	AEROSHELL LGF	02-006
	AEROSHELL SSF	02-004A
	AEROSHELL 01	05-019E
	AEROSHELL 14 (MIL-G-25537)	04-013
	AF-143	08-014B
	AF 163-2K-06	08-042
	AF3024	08-047B
R	AF3024-05	08-047B
	AF444 SPEEDFILL	08-115B
	AIRFRESHENER No. 108 + No. 160	19-022
	AIRVOLT LAMINATE 1C-120B	05-109
	AIRVOLT LAMINATE 1C-180B	05-109
	AKRO FIREGUARD	08-075
	AKRO FIREGUARD	08-076
	AKRO FIREGUARD	08-077
	AL-016-CX	05-100
	ALCOHOL BASED 12001	11-008
R	ALEXIT 400	07-020A
	ALEXIT-FST-404-12	16-047
	ALEXIT-FST-414-12	16-046
	ALEXIT 472-41 + HARD 400 + THIN 901-45	07-006B
	ALEXIT-FST 343-55	16-046A
R	ALEXIT-FST 346-55	16-047A
R	ALEXIT HS 411-77	16-059B
R	ALEXIT HS BASE COAT 411-22	16-064
R	ALEXIT HS BASE COAT 411-14	16-065
	ALEXIT-FST 495-14 + HARD 491-14	16-053
	ALEXIT 495-14 ALEXIT 49114	08-115C
	ALEXIT 5018	07-012
	ALGLASS VISIAL	11-020
	ALCOHOL BASED	11-008A
	ALODINE 1000 (MIL-C-5541)	13-003
	ALODINE 1200 (MIL-C-5541)	13-002
	ALODINE 1500 (MIL-C-5541)	13-003
	ALTUPOL 1	11-015
	ALUMINUM OXYDE 5600-R	05-025B
	ALUMINUM OXYDE (MIL-P-6888)	05-025C

	DESIGNATION	ITEM
	ALUMINUM WOOL	19-012
	AMS 1424	10-001
	AMS 1428	10-003
	AMS 1428	10-004
	AMS 1450	14-010B
	AMS 1451	14-007
R	AMS 1453	14-012A
	AMS 1475	14-001
	AMS 1476	14-001A
	AMS 1526, 1527 OPEN	11-001Q
	AMS 1533 OPEN	11-001
	AMS 1535 OPEN	11-019
	AMS 1550 OPEN	11-017
	AMS 1630 OPEN	11-018
	AMS 3204 OPEN	05-048A
	AMS 3751	05-067B
	ANHYDROUS COPPER SULPHATE	05-098
	APPRETAN	05-034
	ARALDITE AV-138	08-010
	ARALDITE AW-106	08-001
	ARALDITE AW-134	08-010A
	ARALDITE CY-205	08-039
	ARALDITE F	08-039
	ARALDITE LY-560	08-001C
	ARALDITE LY-564-1	08-001C
	ARALDITE LY-5052 + HY-5052 RESIN (EPOXY)	08-090
	ARALDITE LY-5052	05-097
	ARALDITE LY-5082	08-001D
	ARDROX AV 8	15-006
	ARDROX AV 30	15-008
	ARDROX AV 30	15-009A
	ARDROX AV100D	15-008A
	ARDROX LEEDER 140B	11-001L
	ARDROX LEEDER 423Y	14-001C
	ARDROX 1077 (MIL-C-25378)	13-001A
	ARDROX 1218	05-042A
	ARDROX 2104	12-005K
	ARDROX 2526	12-010
	ARDROX 2814	12-014B
	ARDROX 3140	05-019G
	ARDROX 3209	15-007A
	ARDROX 3210	15-005B
	ARDROX 3302 (MIL-C-16173 Grade II)	05-005D
	ARDROX 3313	15-008C
	ARDROX 396/1 (MIL-C-23411)	05-027A
	ARDROX 3966	15-004A
	ARDROX 3402	15-006C
	ARDROX 3403	15-008F
	ARDROX 551G	11-002C

	DESIGNATION	ITEM
	ARDROX 5502	11-002B
	ARDROX 6412	11-001K
	ARDROX 6412M	11-001M
	ARDROX 666/6 (MIL-C-19853)	12-001
	ARDROX 9D-1 (POWDER)	05-036B
	ARMNA G4789	04-024
	AS-100-B	08-027
	ASEPTIC SPRAY	14-002
R	ASNA 4165	09-013A
	ASTM-D-5363 GP04 CL1 GRD1	08-029B
	ASTRAL 7-E-747	07-001
	ASTRAL 7-E-749	07-001
	ASTRAL 7-E-750	07-001
	AS87132 TYPE I OR III	06-004C
	AUTOMATE BLUE SF	05-046
	AUTOMATE RED SF	05-046A
	AUTOMATE YELLOW 8SF	05-046B
	AV5	05-059
R	AVIOX FINISH 77702 + HARD 90150 + ACTIV 98127	16-018G
R	AVIOX FINISH 77702 + HARD 90150 + ACTIV 99321	16-018G
R	AVIOX FINISH 77702 + HARD 90150 + ACTIV 99322	16-018G
R	AVIOX FINISH 77702 + HARD 90150 + ACTIV 99330	16-018G
R	AVIOX FINISH 77702 + HARD 90150 + ACTIV 99341	16-018G
	B-431	05-001A
	BAEP 3536	16-032
	BALTANE	11-004A
	BASE 463-12-8, HARDENER CA116, THINNER C25/90S	16-055
	BASE :PU66 5469/0181, THINNER :0491/9000, HARD :0730/9000	16-056
R	BASE 825-009	16-057
R	BASE 529K002	16-058
	BF-1005(A) WHITE	08-005D
	BIOBOR JF	17-003
	BIOCLEANSE	19-019
	BJO-0930 MICROBALLOONS	05-057
	BLATTANEX 6741	14-004
	BLATTANEX 6764	14-004A
	BMS 10-86	07-003F
	BOESHIELD T-9	05-027D
	BOLIT 707	11-023
	BONDMASTER 114A + Hard EPIKURE RTU	08-030A
	BOSTIK 1787	08-006C
	BOSTIK 2230 Part 1 and Part 2	08-094
	BOSTIK 2402	08-018B
	BOSTICK AXIOM SA 100	08-087
	BR 127	08-055
	BR624	08-046
	BRAYCOTE 248	05-077
	BRAYCOTE 601EF	06-015

	DESIGNATION	ITEM
	BRULIN 815GD	11-024A
R	BSB DUROFIX FIXATIV UW SPECIAL	05-029
	BSB LABEL DUROFIX	05-136
	BTF-427	05-053
	C-13	08-043
	C-15	08-043A
	C-21/100	16-016
	C-3516 (A + B)	09-031
R	CA1000	05-002D
	CA7045 + HARD CA7045B	16-001E
R	CA8351 + HARD CA8310	16-002D
	CAB-O-SIL	05-089
	CAF-4 (MIL-A-25457)	08-004
	CALCIUM HYPOCHLORIT	14-003E
	CAPRAN 512H	05-068
	CARECLEAN AS1	11-026A
	CASTROLAERO 40	02-006B
	CASTROLERO 35	02-004
	CASTROL G-355	04-002
	CASTROL WTR	04-005
R	CEE-BEE E-1004 JBLUE	12-014D
	CEE-BEE E-2012A	12-013A
	CEE-BEE E-1004JN	12-014A
R	CELERO INTERMED COAT 990.09	16-062A
	CELOFLEX	16-031A
	CELOGLISS LAB 1362	07-003E
	CELOMER 4125/2047	16-021A
	CELOMER 5014	16-024
	CETHYL ALCOHOL	06-005
	CHLORKALT	14-003D
	CHLOROTHENE NU	11-004B
	CITRA SAFE	11-016
	CLAY ABSORBENT OR BIOCLEAN	19-019A
	CLAY POWDER	05-038C
R	CLEANING OIL LI AZR	19-029
	CO2 GAS	14-009
	COHRLASTIC 9255 CW-9797 R/C-93594	05-122
	COMORCAP B1/1 (MIL-R-25134)	12-005
	COMORCAP B2 (MIL-R-25134)	12-005F
	COMORCAP B7 (MIL-R-25134)	12-005B
	COMORCAP B10 (MIL-R-25134)	12-005G
	COMORCAP B10	12-010A
	COMORCAP T4 (MIL-C-19853)	12-001C
	COPASLIP PASTE	04-009
R	COR-BAN 35	15-009C
	CORE HRP 3/16-4.0 OR HTP 3/16-4.0	05-087
	COROGARD EC-843-S	07-004
	CV 116 AND ACTIVATOR ACT34	16-021B
	CV 117	07-001F

	DESIGNATION	ITEM
	CV 121 + ACTIVATOR ACT34 + THINNER T74	16-042A
	CYANO-ACRYLATE ADHESIVE	08-033A
	CYCOM HTA 5131/759	08-072
	CYCOM 919-39-3KHS-P-193	05-092
	DAN269 A25	08-085
	DAPCO 2100	09-012F
	DAPCO 2200 TYPE 1	09-023B
	DAPCO 72, PRIMER DAPCO 1-200	09-053
	DC-200	06-012
	DE-ICING 8243	10-001A
	DELAPENA No. 6	06-010
	DELAPENA EXTRA HONING FLUID	06-010A
R	DESOTHANE CA8900 M09004 BASE + HARD CA8000B + THIN CA8000C3	16-061
R	DESOTHANE HS CA8000 BASE	16-059
	DESOTHN HS CLEAR EA8001 B0900C	07-018A
	DILUENT DIESTONE DLS	11-026D
	DISINFECTANT	14-003G
	DISINFECTANT LIQUID	14-006B
	DE SOTO 420-HS	16-048
	DE SOTO 513 X 377	16-049
	DINITROL AV5	05-027F
	DISA LABELS SUPRAFIX	05-135
	DOUBLE BOND	08-091
	DOW CORNING HIGH VACUUM GREASE	04-032
	DP110	08-017D
	D-40	05-047
	D-70 (POWDER)	05-038
	E SOLDER 3021	08-012A
	E-100-B (MIL-C-6799 Type II)	05-032
	EA 9309	08-017
	EA-934NA (MMM-A-132)	08-010C
	EA-9628NW 06	08-042B
	EC-1252	07-020C
	EC-711 (MIL-C-0897) (MIL-A-5092 Type II)	08-018A
	EC-776	09-007A
	EC-1236 (MIL-S-13883)	08-006
	EC-1375 (MIL-W-5044 Type II)	07-007A
	EC-1675-B1/2	09-016A
	EC-1675-B2	09-016A
	EC-1675-GA	09-013A
	EC-1838-B/A	08-001A
	EC-2141 (MIL-C-0897) (MIL-A-5092 Type II)	08-018A
	EC-2214 (MMM-A-132)	08-023
	EC-2216-B/A	08-017A
	EC-3439HT	08-046B
	EC-3500-B/A	08-046A
	EC-3520-B/A	08-054
	EC-3524-B/A	08-022
	EC-3533-B/A	08-017B

	DESIGNATION	ITEM
	EC-3536	08-025A
	EC-843-S	07-004
	EC-847 (MIL-C-4003)	08-006A
	ECA-6.4-50	05-105
	ECA-R-4.8-29	05-108
	ECA-R-6.4-48	05-106
	ECCOBOND 104	08-014A
	ECCOSPHERE R OR FTD 146	05-067
	ELDORADO AC-182	05-042B
	ELECOLIT 342	05-099
R	ELSIL 3% H2O2O	14-003K
R	EN 1040	14-012A
R	EN-72-301	14-012A
R	EN-T-72-181	14-012A
	EPIBOND 1559 A/B	08-067
	EPIKOTE 816	08-030
	EPIKOTE 816 + ARALDITE HY943	08-030B
	EPIKOTE 828 + VERSAMID 125	08-059
	EPOCAST 52 A/B	08-098
	EPOCAST 1616 A/B	05-090
	EPOCAST 1633 A/B	08-115
	EPOLAM 2500/2501	08-116A
	EPON 828 + VERSAMID 125	08-059
	ERU-CHLORKALK	14-003A
	ESSO 2120A	03-004A
	ESSO TURBO OIL 2389 (MIL-L-7808)	03-003
	EVO-STIK 5007/3	08-006D
	EXXON 5182	04-016
	E 43 or SK 43 or SWS 951	08-026
	INTERFLEX 5470/0000	16-031
	F3T-282	05-088
	F.H.S (MIL-H-5606)	02-001
	FABRIC C-303 (MIL-B-131)	15-002
	FAKOPOL	05-008
	FC-87 FURON	19-013
	FE 50/6 HV	16-021
	FE 102 + HARD No. 102 + THIN T115	16-036
	FEL PRO C5-A (MIL-A-907)	04-014
	FILLERALU	05-051
	FILLER L-43	08-037
	FINALIN No. 2	16-045
	FINALIN 943	08-008
	FINCH PAINT 473-13	16-015
	FLASHBREAKER 1R	05-138
	FL-4300	16-001A
	FL-4307	16-002B
	FL-7XXX	07-009
	FL-7XXX	07-010
	FL-7XXX	07-011

	DESIGNATION	ITEM
	FL-7XXX	07-008
	FLOORSIL 2	09-054
	FLOORSIL 87	09-036
R	FLOORSIL 1217	08-057A
	FLUGENE 113	11-005A
	FLUID CHILLER COOLANT	05-049
	FLUORESCENT DYE OS-31	05-045
	FLUORESCENT DYE PIGMENT	05-045B
	FLUORESCENT DYE OS-80	05-045A
	FLUOROCARBON MS-122	05-020A
	FLUOROCARBON 211 (MIL-L-60326 Type I)	05-020
	FLUOROGLIDE	05-043A
	FM41	08-047A
	FM73-M-03	08-088
	FM73-M-06	08-042A
	FM410-1	08-047C
	FORALKYL 2050	05-120
	FORANE 113	11-005A
	FREKOTE 700-NC Release Agent	05-093A
	FREON T-F. (MIL-T-28809)	11-005
	FUEL JP1	01-001
	FUEL JP4 (MIL-T-5624)	01-002
	FUEL JP5 (MIL-T-5624)	01-003
	FUEL SUBSTITUTES	01-007
	FUEL SUBSTITUTES	01-008
	FUEL TRO	01-001
	FUEL TR4 (MIL-T-5624)	01-002
	FUEL TR5 (MIL-T-5624)	01-003
	FUEL TURBO JP8	01-006
	FUEL TURBO RT	01-004A
	FUEL TURBO TS-1	01-004
	FUEL TURBO TH	01-005
	FR 1/55	16-046B
	FRS 30	16-046C
	F407-616	07-003D
	F407-729	16-002
	F427-2900 SERIE + HARD F210-731 + THIN 851-808	16-042
	F565-629 + HARD F275 - 134 + THIN 851-1179	16-043
	F565-711 + HARD F210-772 + THIN 850-1303	16-044
	F566-4200 + Hard N39/1327 + THINNER N39/3460	16-024A
	F580-2010 (MIL-P-23377 Class I)	16-006
	F580-2080 (MIL-P-23377 Class I)	16-006B
R	F69 BLUE BASE	07-001G
R	F69 BASE	16-021C
	G-12-E-25	07-004A
	GC-1500 (MIL-S-83430)	09-022
	GC1 and GC2 (MIL-L-25567 Type I)	05-004
	GENKLENE (MIL-T-81533)	11-004
	GETAFIL N ET.40	19-021A

	DESIGNATION	ITEM
	GILL FAB 1367E, Class 2, Grade A, Type 50	05-110
	GILL FAB 1367E, Class 2, Grade A, Type 70	05-110
	GILL FAB 6167-016905 OR 6367-016905	05-072
	GILL FAB 6167-030907 OR 6367-030907	05-073
	GILLPATCH 1367P	08-113A
	GILLPATCH III	08-114A
	GLASS/VITON MATERIAL GV005/4	05-103
	GLASS FIBRE Type 120-38% RESIN (MIL-R-9300 Type I)	05-107
	GLASSCLOTH (MIL-C-9084 Type V)	05-050
	GLASSCLOTH 3NX1R20	05-061A
	GLASSCLOTH 3V1R20	05-061
	GLASSCLOTH 827	05-060
	GLASSCLOTH 91111 (MIL-C-9084 Type III)	05-033
	GLASSCLOTH 92110	05-056
	GLUE C-13	08-043
	GLYCEROL OR GLYCERIN	06-017
	GLYCOL (MIL-A-8243)	10-001
	GLY-VAK	11-034
	GRANGER 610-1016	08-012
	GRAPHITE POWDER	06-007
	GREASE (AIR 4215)	04-019
	GREASE (MIL-G-3545)	04-001
	GREASE (AIR 4206)	04-002
	GREASE (MIL-T-5544)	04-003
	GREASE (MIL-G-6032)	04-006
	GREASE (MIL-G-25760)	04-005
	GREASE (MIL-G-25013)	04-010
	GREASE (MIL-G-81322)	04-004A
	GREASE (MIL-G-81322)	04-022
R	GREASE (MIL-PRF-83483)	04-020
	GREASE AEROSHELL 14 (MIL-G-25537)	04-013
	GREASE EXXON 5182	04-016
	GS213 TACKY	09-033A
	GTL COMPRESSOR CLEAN	11-013
	GUPOFLEX 301	05-071
	G0904 D 1070 TCT HS	05-117
	G0904 D 1070 TCT HS	05-119
	G814NT	05-088
R	HBIOT50	14-003J
R	HERLISIL	14-003H
	HERMETAL	09-010
R	HEXFORCE G0926 1304 TCT	20-036
R	HEXFORCE G0926 1034 TCT	20-036A
	HF-407	16-018A
	HF-819	04-008C
	HF-825	04-008
	HF-827	04-008A
	HF-866	04-008B
	HMX-1/4-3.0	05-106

	DESIGNATION	ITEM
	HMX-1/4-3.1	05-105
	HMX-3/16-OX-1.8	05-108
	HOECHST 1704 LTV	10-003B
	HONEY BEE 60	11-028
	HRH 10-1/4-3.1	05-105
	HRH 10/OX-1/4-3.0	05-106
	HRH 10/OX-3/16-1.8	05-108
	HS-8171	05-068A
	HYDRAULIC FLUID (MIL-H-6083D)	02-001A
	HYDRAUNYCOIL FH 6 AW	02-004C
	HYJET III	02-002A
	HYJET IV	02-003
	HYJET IV-A	02-003C
	HYJET V	02-003E
	HYLOMAR SQ-32M OR SQ-32L	05-017
	HYJET IV-A PLUS	02-003D
	HYSOL EA960F	16-054
	HYSOL EA 9309	08-017
	HYSOL EA-9321	08-010D
	HYSOL EA-9330/1	08-017C
	HYSOL EA9390	08-071
	HYSOL EA9394	08-078
	HYSOL EA9396	08-070
	HYSOL EA-934NA (MMM-A-132)	08-051
	H500-WF	05-113
	IG 101	05-067A
	IRIDITE 14-2	05-070
	ISOFLEX PDL 300 A	04-033
	ISOPAR H	11-026B
	ISOPROPYL ALCOHOL (TT-I-735)	11-010
	ISOTAC Y9473	08-066
	INSULATING ADHESIVE TAPE (MIL-I-19166)	08-032A
	INSULATING (SAE-AS8660)	05-001B
	INTERPLAN 100 SP FINE TYPE B	08-036A
	JENOLITE RRN-1	05-006
	JEHIER 865	05-081
	JET A1	01-001
	JET K-0601 (MIL-P-6888)	05-025A
	JFM 1675 GB	09-016C
	JP 4	01-002
	JP 5	01-003
	KATHON FP 1.5	17-003A
R	KB29	08-104
R	KB42	08-073A
R	KB49	08-104A
	KI-OSE No. 320	11-007C
	KI-OSE No. 325, No. 327	14-012
	KILBAT No. 250	14-004D
	KILLFROST ABC 3	10-003A

	DESIGNATION	ITEM
	KLINGERFLON	05-043
R	KOROFLEX	07-018C
	KOROFLEX PRIMER 823X439	07-019
	KRYTOX 240AC	05-003B
	KR1 ADHESIVE REMOVER	11-021
	K7	06-004A
	L-0801/2	12-004A
	L-43	08-037
	LAMINAR X-500	16-050
	LC 756975 BASE + ACCELERATOR FL4206 + THINNER F4 4207	16-024B
	LINT FREE COTTON CLOTH	19-003
	LIQUI-MOLY Grade NV	06-013
	LN-9368	07-007C
	LN-29967	05-085
	LOCKWIRE 0.5 mm	19-009
	LOCKWIRE 0.6 mm	19-018
	LOCKWIRE 0.8 mm	19-010
	LOCKWIRE 1.25 mm	19-017
	LOCQUIC N (MIL-R-46082)	08-009A
	LOCQUIC T (MIL-R-46082)	08-009
	LOCTITE IS 415 (ex : IS 150)	08-033
	LOCTITE PRIMER N (MIL-R-46082)	08-009A
	LOCTITE PRIMER T (MIL-R-46882)	08-009
	LOCTITE 221 (MIL-R-46082 Type III)	08-013
	LOCTITE 221	08-048A
	LOCTITE 222	08-013B
	LOCTITE 241 (MIL-R-46082 Type II)	08-007
	LOCTITE 242	08-007B
	LOCTITE 259	08-013A
	LOCTITE 270 (MIL-R-46082 Type I)	08-002
	LOCTITE 271	08-002B
	LOCTITE 273	08-002A
	LOCTITE 274	08-007A
	LOCTITE 290 (MIL-R-46082)	08-003
	LOCTITE 307 (MIL-R-46082 Type III)	08-024
	LOCTITE 542	08-049
	LOCTITE 601	08-029A
	LOCTITE 641	08-034A
	LOCTITE 672	08-034
	LOCTITE 675	08-029
	LOCTITE 680	08-050A
R	LOCTITE 7649	08-009A
	LOTOXANE SOLVANT	11-026
	LOW VOC EXTERIOR TOP COAT	16-018E
	LPS-3	15-005A
	LPS B-1007	15-008D
	LPS PRESOLVE	11-026C
	LR-8123	07-002
	LUBRIBOND 220	06-001B

	DESIGNATION	ITEM
	LUBRICANT (ZFB-831)	04-025
	LUBRICATING OIL TURBINE ENGINE SYNTHETIC BASE	03-002
	LUBRICATING OIL TURBINE ENGINE SYNTHETIC BASE	03-003
	LUBRISOL 1395	02-005
	LYSOL LIQUID	14-008
	M-140-182	12-007A
	MAGNA COATING 7-X-74 FC	07-003
	MAGNUS 149-X AERO	11-001P
	MAN-852	06-010B
	MARBOCOTE TRE 45	05-093
	MASTINOX D40 (MIL-C-11796)	05-047
	MASTINOX 6856H	05-115
	MASTINOX 6856K (MIL-P-8116)	05-002
	MC-216 A-2	09-018D
	MC-216 B-2	09-019D
	MC238A	09-013G
	MC238B	09-016H
	MC238C	09-005F
R	MC-780A	09-061
R	MC-780B	09-060
R	MC780C	09-043D
R	MC780C	09-005G
	MCS-352	04-015
	MEK (TT-M-261)	11-003
	MELINEX FOIL (MIL-E-631)	05-023
	METAFLEX FCR	16-020A
	METAFLEX WR + HARD META.WR + THIN C25/90S	16-041
	METALIX NPS	08-008B
	METHYL ALCOHOL	11-006
	METHYLETHYL KETONE (TT-M-261)	11-003
	MICRO BALLOONS BJO-0930	05-057
	MIL-A-46050 TYPE I CLASS 3	08-033A
R	MIL-I-46058 TYPE AR	07-016A
R	MIL-I-46058 TYPE UR	07-016A
R	MIL-I-46058 TYPE XY	07-016A
	MIL-T-4053	08-060A
	MIL-L-23398 (OPEN)	06-001C
	MIL-L-23699 (OPEN)	03-002
	MIL-L-25567 TYPE I	05-004B
	MIL-O-27210	05-078
	MIL-T-27730-OPEN-TAPE	08-063B
	MIL-T-60394-TYPE 1 CLASS 1	08-065A
	MIL-W-5044-TYPE 1 OPEN	08-064A
	MIL-C-9084-TYPE III OPEN	05-033A
	MINERAL BASE OIL (MIL-L-6081)	03-008
	MINERAL GREASE (MIL-G-3545)	04-001
	MINERAL GREASE (MIL-G-7187)	04-002
	MINERAL OIL (MIL-L-7870)	03-001

	DESIGNATION	ITEM
	MINERAL OIL (VV-L-800)	03-001A
	MIRROR GLAZE (MIL-C-18767)	05-055
R	MOBILGREASE 33	04-037C
	MOBIL JET OIL II (MIL-L-23699)	03-002
R	MOLYCOTE 33M	04-017A
	MOLYKOTE G (MIL-L-8937)	06-002
	MOLYKOTE G RAPID PLUS PASTE	06-008
	MOLYKOTE G RAPID PLUS SPRAY	06-014
	MOLYKOTE Z (MIL-M-7866)	04-007
	MOLYKOTE 33 (MIL-G-46886)	04-017
	MOLYKOTE 106	06-011
	MOLYKOTE 3402 (MIL-L-23398)	06-001
	MOLYKOTE 3402C	06-001A
	MOLYKOTE 55M (MIL-G-4343)	04-011
	MOLYKOTE 44 MIDIUM	04-031
	MOLYKOTE Z	06-016
	MS-122	05-020A
	MS-4 (SAE-AS8660)	05-001
	MYSTIK 7505	08-097D
	N-51/7315	12-004
	N-53621	07-007B
	N-53624	16-018
	N-53628	16-013
	N-53631/5/062	16-001
	N-53639	07-007B
	N-53651	07-010A
	N-53652	16-011
	N-58479/T508	08-036
	N-59111/MB37601 (MIL-C-7439 Type II)	07-005
	N-59300	08-008A
	N-59502 (MIL-C-7439 Type II)	07-006
	NAPHTHA AND HEXANE	11-012
	NAPIER SV-35/PMA	12-015A
	N-59660	16-012
	NC-4 (TT-C-1558 Type I)	16-007A
	NETAL A202	11-011G
	NETAL SL-8	11-001H
R	NET BIOKEM DSAM	14-006C
	NETOIL SN6	12-001A
	NETOIL 4452B	12-006A
	NEVER SEEZ STANDARD	04-014A
	NEVER SEEZ	04-014A
	NEXTEL 3101-A10 (TT-C-1558 Type I)	16-009
	NEXTEL 3101-B2 (TT-C-1558 Type I)	16-007
	NEXTEL 3101-C10 (TT-C-1558 Type I)	16-010
	NEXTEL 3101-S3 (TT-C-1558 Type I)	16-014
	NICKEL SPECIAL	05-063
	NIMBUS R75	04-024C
	NITRIC ACID	05-111

	DESIGNATION	ITEM
	NITROGEN (GASEOUS)	19-014
	NM220 DTEX 4X3	19-007
	NONIDET LE	11-009
	NOVASIL 1217	08-057
	NOVAFLEX HU01	08-044A
	NOVEROX AX	13-004
	NSA 3811-0	19-027
R	NYCO GREASE GN 144	04-024B
R	NYCO GREASE GN 148	04-037D
	NYCOTE 7-11	07-001B
	NYCOTE 7-11	16-003
	NYCOTE 88	07-023
	NYLON BS JF 120 NT4	19-020
R	OPEN-NON DRYING OILY CPC	15-004C
	OPEN WEAVE 250	05-021
	OPTIMOL AEROPLEX ZF1	04-025A
	OPTIMOLY PASTE WHITE T	04-018
	ORCOTAPE OT-40	08-079
	ORGOL 8600	07-016
	ORTHONETOIL P	12-006
	OS-31	05-045
	OS-80	05-045A
	OS-124, OS-138, MCS-210	06-009
R	OTTO PRIMER 1217	08-057B
	OYLTITE	09-008C
	P-99	16-020
	P-421	08-097B
	P-621	08-053A
	PAC-33	16-001C
	PAINTEX 2000	12-005H
	PAINTEX 2007B	12-016
	PARCOFILM 303	05-027G
	PASA-JELL 105	08-106
	PD-680 OPEN	11-002
R	PELLICAL 119C	15-003
	PERMACEL P11	08-052A
	PERMACEL P12	08-061
	PERMACEL P55	08-112
	PERMACEL 50 or 55	08-062
	PERMACEL 621	08-060
	PERMAGLASS 400	08-113
	PERMETHRIN EC10	14-004E
	PERMETHRIN No.240	14-011
	PERMETHRIN 216, 217, 236	14-010A
	PETROLATUM (VVP-236)	04-012
	PHENOTHRIN	14-010
	PIPE CLEANERS	19-006
	PLASTIC CLEANER (MIL-D-16791 Type I)	05-010

	DESIGNATION	ITEM
	PLASTIC POLISH MIRROR GLAZE (MIL-C-18767)	05-055
	PLASTIC POLISHING	05-009
	PLEXOL HF-825	04-008
	POLYMERIC YARN 681711	05-104
	POLYURETHANE NON SLIP COATING	07-007D
	PP609 + HARD CTH 609 + THIN T105	16-037
R	PQ 10050-090-03	15-008C
	PR123 + HARD No. 123 + THIN T115	16-038
R	PR-143/C4334	16-006C
	PR 148AF	09-028A
	PR-186	09-028F
	PR-205 BASE/HARDENER	16-006E
	PR-1005-L (MIL-S-4383)	09-007
	PR-1221-A (MIL-S-7502 Class A)	09-008
	PR-1301	09-024
	PR-1403GA	09-018
	PR-1403-GB	09-019
	PR-1422-A (MIL-S-8802 Class A)	09-001
	PR-1422-A-NA	09-001B
	PR-1422-A-NA	09-017B
	PR-1422-A-NA	09-013C
	PR-1422-B2	09-002
	PR-1422-B-NA	09-002B
	PR-1422-GBT (MIL-S-81733 Type I)	09-013A
	PR-1425	09-045
	PR-1428-A	09-018C
	PR-1431 TYPE I	09-043
	PR-1431 TYPE T	09-042
	PR-1431-G	09-005
	PR-1432-GP	09-050
	PR-1435-G	09-021
	PR-1436-G Spray (MIL-S-81733 Type III)	09-025
	PR-1436-GA (MIL-S-81733 Type I)	09-013
	PR-1436-GA(NA)	09-013B
	PR-1436-GB1/2 (MIL-PFR-81733D Type II)	09-016
	PR-1436-GB-NA	09-016B
	PR-1440-A	09-013D
	PR-1440-A	09-001C
	PR-1440-B	09-002C
	PR-147	09-028
	PR-148	09-028B
	PR-149	09-055
	PR-1720-SM	09-011
	PR-1732	09-011
	PR-1733	09-011

	DESIGNATION	ITEM
	PR-1750-A	09-046
	PR-1750-B	09-047
	PR-1764	09-051A
	PR-1765 (Base and Accelerator)	09-051
	PR-1776-B	09-002D
R	PR1782A	09-061A
R	PR1782B	09-062
	PR-1784-B1/2	09-045A
	PR-1826-B	09-058A
	PR-1826-B + PRIMER PR-1826	09-008E
	PR-1828-B	09-058B
	PR-1828-B + PRIMER PR-186	09-008F
	PR-1910	09-012G
	PR-2001-B	09-008G
	PR-2001-B	09-058C
R	PR2001B	09-016J
	PR-2752	09-035
	PR-340	09-004
	PR-5401-K (MIL-S-8802 Class A)	09-008
	PR-7422-1/2	09-017
	PR-812 (MIL-S-38249)	09-023
	P-R-F-91	05-024
	PRIMER (MIL-R-46082)	08-009
	PRIMER NR81	08-028
R	PROCYON AB	15-008G
R	PROPACO SC	15-003A
	PROTEX GM-2	05-005E
	PROTEX PE 641	15-004B
	PROTEX PE 645	15-006B
	PROTEX PE 647	15-007C
	PROTEX PE 649	15-008E
	PROTEX 1619	05-019C
	PROTEX R-09	05-027E
	PROPHOT	11-020A
	PS-706-B	09-015A
	PS-707-BT	09-008B
	PS-860-B 1/6	09-008D
	PS-860B	09-058
	PS-870A	09-013F
	PS-870-B	09-016F
	PS-870-C	09-005E
	PS-890/A	09-001A
	PS-890-A	09-013E
	PS-890/B	09-002A
	PS-892-C	09-043C
	PSA529 + SRC18	08-093
	PU-66	16-016B

	DESIGNATION	ITEM
	PU-66	16-018C
	PU-66 5447/XXXX	16-029
	PU-66 (5467/0000 +0735/9000)	16-051
	PURASOLVE ELS	11-027
	PURE CLEANER DISINFECTANT	14-008A
	PVAC-APPRETAN	05-034
	PVC DISKS 5440 GS OR BS	05-052
	PYROFLEX 7-D-713	07-005A
	PYROLAC NC-4 (TT-C-1558 Type I)	16-007A
	PYROSYL 7-G-888 (MIL-P-14276)	16-004
	QUARTASEPT	14-006A
	Q73	05-116
	QZ-11B	05-013
	QZ-5111	05-013A
	RACASSAN SUPER READYPAC	14-001B
	REDUX 322	08-014
	REDUX 252	08-022C
	REDUX 403	08-086
	REDUX 408	08-001B
	REDUX 408 B/A	08-010B
	REDUX 420	08-089
	REF 7	19-023
R	REF 8-5	19-023A
	RELINK 2318; VERSION B	08-118
	REPAIR COMPOUND ADHESIVE A AND HARDENER B	08-103
	RHODORSIL B-431	05-001A
	RHODORSIL CAF-4 (MIL-A-25457)	08-004
	RICE HULLS	05-058
	RIGID FOAM SHEET	05-035
	RILSANOL 17	08-044
	RILSANOL 21	08-044
	RK6014	05-062
	RK6619	09-027
	ROCKET WD-40 (MIL-C-23411)	05-027
	ROCOL AEROSPEC 100	04-025B
	ROHACELL 71WF	05-075
	ROYCO C-201	04-030
	ROYCO LGF	02-006A
	ROYCO SSF	02-004B
	RMP SPECIAL	05-058
	RT 602 A/B	08-101
	RTV CLEANER DISINFECTANT	14-008B
	RTV-88	09-012E
	RTV-106	08-056
	RTV-159	08-095
	RTV-188	09-012C
	RTV-730	09-026

	DESIGNATION	ITEM
	RTV-731	08-004A
	RTV-732	08-004A
	RTV-738	08-004A
	RUBBER PACKING STRIP	05-048
	RUST BAN 395 (MIL-C-16173 Grade II)	05-005A
	RUST BAN 397 (MIL-C-16173 Grade IV)	05-019D
	S-15/37	16-004A
	S-15/90	16-001B
	S-707	08-011
	S-1125 (RK6619)	08-092
R	SAE AMS 1428	10-005
	SAFETY WALK BLACK REF 610	08-117
	SAGROMED 2007	14-006
	SAN 10-1	11-007
	SAN 10-2	11-007A
	SAN 40	19-024
	SAN 50	11-007B
	SANOSIL	14-003L
	SANTOVAC 5	06-009A
	SCALPEX G5	12-005J
	SCAPANET 3026	11-002A
	SCOTCH BRAND	08-068
	SCOTCH BRITE PADS	19-011
	SCOTCH CHROM FOIL 530	08-019
	SCOTCH MOUNT 4016 (MIL-T-60394 Type I)	08-065
	SCOTCH SJ-8671	05-065
	SCOTCH WELD	08-069
	SCOTCH WELD 1099	08-006B
	SCOTCH WELD 1099	08-011A
	SCOTCH WELD 1300L	08-018
	SCOTCH WELD 3532 B/A	08-025
	SCOTCH WELD 3549 B/A	08-051A
	SCOTCH WELD 3549 B/A	08-025B
	SCOTCH 950	08-082
	SCOTCH 61	08-097A
	SCOTCH 69 (MIL-I-19166)	08-032
	SCOTCH 361	08-053
	SCOTCH 425 + SCOTCH Y 425	08-052
	SCOTCH 861-HS	05-096
	SCOTCH 5453	08-041
	SEALANT, HIGH TEMPERATURE	08-007C
	SECURING LACQUER	07-020
	SERMETEL W	07-021
R	SHELL TONNA S220	03-006
	SHERLOCK 5 (MIL-L-25567 Type I)	05-004A
	SIKKENS C21/100	07-017
	SIKKENS G-12-E-25	07-004A
	SIKKENS 82522	12-005D
	SILASTIC E43 OR SK43	08-026

	DESIGNATION	ITEM
	SILASTIC 9161 RTV + Hard N9162 + PRIMER DC1200	09-052
	SILCOSET 101	09-012D
	SILICONE MS-4 (SAE-AS8660)	05-001
	SKYDROL LD	02-002
	SKYDROL LD4	02-003B
	SKYDROL 500 B/4	02-003A
	SK-43 or E43	08-026
	SM 5144	05-069
R	SOAP (VISCOSITY LT30 MPA/S)	11-031
	SOAP SOLUTION	11-005
	SOCOPAC 25H	15-006A
	SOCOPAC 25S	15-005
	SOCOPAC 50H	15-008B
	SOCOPAC 50S	15-007
	SOCOSOLV A3582	11-032A
	SOCOSTRIP A0102N	12-013B
	SOCOSTRIP A0212	12-014C
	SOCOSTRIP A0103N	12-016A
	SODIUM HYPOCHLORITE (OPEN)	14-003F
	SODIUM ALIGNATE	05-064
	SODIUM DICHROMATE	05-112
	SOLUTION GC1 and GC2	05-004A
	SOLVOL METAL POLISH	05-114
	SPCA AD104	10-003
	SPCA 7098A	12-005C
	SPEED PATCH AF800 SERIES	08-114
	SPRAY TEFLON TYPE 2000 OR TYPE 6044/6040	05-043B
	SPRAYLAT E-100B	05-032
R	SPSA-205	08-085A
	SPS LUBE-6	06-004B
	SPS LUBE-7	06-004
	SS 4004	08-096
	SS 4044	08-096A
	STAINLESS STEEL YARN SFY 750	05-102
	STEELGARD	05-027G
	STEWART PATCH FIELD KIT SP-R030-66	05-079
	STOVE ENAMEL 690-152-004	07-015
	STRONTIUM CHROMATE TABLET	17-001
	SUPERFLEXIT S-707	08-011
	SYNCLAIR	11-001C
	SYNTHETIC FIBRE CORD	05-016
	SYNTHETIC GREASE (MIL-G-23827)	04-004
	SYNTHETIC GREASE	04-004B
	SYNTHETIC GREASE (MIL-G-23827)	04-024A
	SYNTHETIC GREASE (MIL-G-25760)	04-005
	SYNTHETIC GREASE (MIL-G-81322)	04-004A
	SYNTHETIC GREASE (MIL-G-81322)	04-022
	SYNTHETIC OIL (MIL-L-23699)	03-002
	SYNTHETIC OIL UNIVIS P-12 (MIL-L-6085)	03-007

	DESIGNATION	ITEM
	SYNTHETIC RUBBER STRIP	05-048
	TC-100	11-013A
	TECTYL 502C (MIL-C-16173 grade II)	05-005
	TECTYL 506 (MIL-C-16173 grade IV)	05-019
	TECTYL 846 (MIL-C-16173 grade IV)	05-019A
	TEEPOL 610 (MIL-D-16791 Type I)	11-001
R	TEDLAR TGY20BE3	19-015
R	TEDLAR TWH10BS3	19-016
	TELDAR PFV	08-083
	TEMP-R-TAPE TV	08-097C
R	TERUL 18	08-122
	TEROSTAT 81	09-030
	TESA MOLL 4700 OR 4702	08-005
	TESABAND 4541	08-038
	TESAMETAL 4500	08-061A
	THERMOWELDABLE C-303 (MIL-B-131)	15-002
	TITANINE FE-50/6HV	16-021
	TITANINE JC5A	05-002C
	TITANINE LR-8123	07-002
	TITANINE T-5	11-003A
	TIVOPAL 8357/5	16-023
	TN 10106	07-006A
	TOUCH-N-PREP ALODINE 1132	13-005
	TR0	01-001
	TR4	01-002
	TR5	01-003
	TR6/2SK	05-086
R	TS130/NC/5PB	12-008
	TURCO AIR TEC (MIL-C-25769)	11-001A
	TURCO PAINTGON (MIL-R-8633)	12-002
	TURCO PRE-PAINT (MIL-C-10578 Type II)	13-001
	TURCO PRETREAT	05-094
	TURCO THORAL	14-001
	TURCO 1495 (MIL-P-6888)	05-025
	TURCO 2822 (MIL-R-81903)	12-003
	TURCO 4104	05-095
	TURCO 4215 NC	11-024
	TURCO 4377B	12-005L
	TURCO 4377B (MIL-R-8633)	12-010B
	TURCO 5351	12-005I
	TURCO 5873NC	12-005E
	TURCO 6776-LO	12-014
R	TURCO 6780	11-033
	TURCO 6813-9X	12-011A
	TURCO 6840-S	12-011
	TURCO 6840-S	12-012
	TURCO 6881	12-015
	TURCO 6930	12-015B
	TURCOAT 3286 (MIL-C-10578 Type II)	05-042

	DESIGNATION	ITEM
	TURCOAT 4786 (MIL-P-16232 Type VII)	05-041
	TURMOGREASE LI AZR	04-025C
	UNIMOLY GL 82	04-029
	UCAR 250-3	10-003C
	UNIVERSAL PLASTIC CLEANER	05-010
	UNIVIS P-12 (MIL-L-6085)	03-007
	VALENTINE 08525	16-017
	VARSOL	11-002
	VASELINE (VVP-236)	04-012
	VERMICULITE	05-038D
	VICOTEX 913/46/G814NT	05-091
R	VILEDON P15-1505	19-028A
	W-5-322	05-088
	WADIS 24	15-004
	WAX CRAYON	19-005
	WD-40 (MIL-C-23411)	05-027
	WHITE SPIRIT (PD-680)	11-002
	WHITE TALCUM POWDER	19-004
	WIRE, SS, BRAIDED 16/2/38 SWG	19-001
	XYLENE FLUID	11-022
	Y436	08-061B
	Z-17.614	05-101
	ZFB-831	04-025
	ZINC CHROMATE 700-153-003	07-014
	ZINC POWDER	05-054
	ZOK 27	11-014
	23-T3 Series +ACTI. PC-216+ THIN TR55	07-003G
	091-23	16-018B
	121-TAPE	08-063
	181 (MIL-C-9084 Type VIII)	05-007
	211 (MIL-L-60326 Type I)	05-020
	250	05-021
	3M SAFETY WALK 310	08-064
	3M SCOTCH	05-121
	3M 7924 SILVER	08-108
	3M 8673 ANTI EROSION TAPE	05-132
	3NX1R20 SUPERFLEXIT	05-061A
	3V1R20	05-061
	3524 A/B FST	08-115A
	406R65-1	11-030
	421-TAPE	08-063A
	463-6-11 + Hard. X315 + Thin. TL65	16-033
	473-13	16-015
	4080 SEMI GLOSS	16-007B
	4125/6407 BLAU	07-001D
	5015 BC WHITE PATCH	05-129B
	5015 GS GREY PATCH	05-129C
	5279/15 FIXATIVE FOR DECAL	05-137
	5481	08-097

	DESIGNATION	ITEM
	5600R	05-025B
	690-152-004	07-015
	643-3-9 + Catalyst X310A + Reducer TL59	16-034
	7-D-1586/Y-1407	16-008A
	7-D-1586/2080	16-002A
	7-D-713 (MIL-C-7439 Type II)	07-005A
	7-E-747	07-001
	7-E-749	07-001
	7-E-750	07-001
	7-G-888 (MIL-P-14276)	16-004
	7-X-74FC	07-003
	700-153-003	07-014
	1717-AMS66/6	12-005N
	83-182	11-031A
R	83-182/0X	11-031A
	8672 TAPE POLYURETHANE	05-129
	8671 TAPE POLYURETHANE	05-129A
	895-3-B	12-005M
	64023-678	11-003B
	839-51/1	08-035
	7840/3	19-008
	9050	16-016A
	37045 + HARD S66/22R + THIN C25/90S	16-040
	3745 + HARD S66/14 For Faster Drying S66/22R + THINNER C25/90S	16-024C
	231230, 231231 AND 231255	05-080

**ON A/C 001-100,

1. Fuels

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
01-001	FUEL TURBO	F	AIR 3405	Kerosene Type	Any
	or JET A-1	D	None	Jet Fuel	Petrol
	(ex JP-1A)	GB	DERD.2494	Freezing point :	Company
		USA	ASTM-D-1655	-47 deg.C	
			(JET A-1)		
		NAT	F35		
OR-----	----------	---	----------	----------	
01-001A	FUEL TURBO	F	None	Kerosene Type	
	or JET A	D	None	Jet Fuel	
		GB	None	Freezing point :	
		USA	ASTM-D-1655	-40 deg.	
01-002	FUEL TURBO	F	AIR 3407	Wide Cut Type Jet	Any
	or TR4 or JP4	D	NONE	Fuel	Petrol
		GB	DERD.2454		Company
		USA	MIL-T-5624		

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
			(Grade JP4)		
		NAT	F40		
01-003	FUEL TURBO or TR5 or JP5	F	AIR 3404	High Flashpoint Jet Fuel	Any Petrol Company
		D	NONE		
		GB	DERD.2452		
		USA	MIL-T-5624		
			(Grade JP5)		
		NAT	F44		
01-004	FUEL TURBO TS-1	RUS	GOST 10227/86	Kerosene Type Jet Fuel Freezing point : -60 deg.C	Russian Petrol Company
OR 01-004A	FUEL TURBO RT				
01-005	FUEL TURBO TH	ROM	STAS 5639/88	To be used with Additive to achieve 50-450 PS/M	Romanian Petrol Company
01-006	FUEL TURBO JP8	F	AIR 3405	Jet fuel	Any Petrol Company
		D	NONE		
		GB	DERD.2453		
		USA	MIL-T-83133		
		NAT	F34		
01-007	FUEL SUBSTITUTES SHELLSOL D60				1R2U1 K5591
01-008	FUEL SUBSTITUTES SOLTROL 220				-0316 -0317

**ON A/C 101-200,

1. Fuels

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
01-001	FUEL TURBO or JET A-1 (ex JP-1A)	F	AIR 3405	Kerosene Type Jet Fuel Freezing point : -47 deg.C	Any Petrol Company
		D	None		
		GB	DERD.2494		
		USA	ASTM-D-1655		
			(JET A-1)		
		NAT	F35		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
OR					
01-001A	FUEL TURBO	F	None	Kerosene Type	
	or JET A	D	None	Jet Fuel	
		GB	None	Freezing point :	
		USA	ASTM-D-1655	-40 deg.	
01-002	FUEL TURBO	F	AIR 3407	Wide Cut Type Jet	Any
	or TR4 or JP4	D	NONE	Fuel	Petrol
		GB	DERD.2454		Company
		USA	MIL-T-5624		
			(Grade JP4)		
		NAT	F40		
01-003	FUEL TURBO	F	AIR 3404	High Flashpoint	Any
	or TR5 or JP5	D	NONE	Jet Fuel	Petrol
		GB	DERD.2452		Company
		USA	MIL-T-5624		
			(Grade JP5)		
		NAT	F44		
01-004	FUEL TURBO	RUS	GOST 10227/86	Kerozene Type Jet	Russian
	TS-1			Fuel	Petrol
					Company
or					
01-004A	FUEL TURBO			Freezing point:	
	RT			-60 deg.C	
01-005	FUEL TURBO	ROM	STAS 5639/88	To be used with	Romanian
	TH			Additive to achieve	Petrol
				50-450 PS/M	Company
01-006	FUEL TURBO	F	AIR 3405	Jet fuel	Any
	JP8	D	NONE		Petrol
		GB	DERD.2453		Company
		USA	MIL-T-83133		
		NAT	F34		
01-007	FUEL				1R2U1
	SUBSTITUTES				K5591
	SHELLSOL D60				
01-008	FUEL				-0316
	SUBSTITUTES				-0317
	SOLTROL 220				

**ON A/C ALL

2. Hydraulic Fluids

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	02-001	OIL HYDRAULIC PETROLEUM FLUID	F	AIR 3520	Landing gear shock absorbers flap and slat transmission systems	N-F1858
			D	NONE		N-F2429
			GB	DF.ST-91-48		N-F3528
			USA	MIL-PRF-5606		N-F4101
						US-59595
						US-07950
	OR					
	02-001A	HYDRAULIC FLUID	F	None	Flap and Slat transmission systems	LOCAL PURCHASE
			D	None		
			GB	DTD-5540		
			USA	MIL-H-6083D		
			C	Z-20.202		
	02-002	SKYDROL LD	F	NSA-307-110	Hydraulic power OBSOLETE TO BE REPLACED BY : ITEM 02-003	N-F3528
			D	None		N-F4101
			GB	None		US-76541
			USA	None		
	OR					
	02-002A	HYJET III				N-F2429
						US-94548
	02-003	HYJET IV	F	NSA-307-110 Type 4	Hydraulic power	N-F2429
			D	None		US-94548
			GB	None		
			USA	BMS-3-11F		
			C	Z-20.208		
	OR					
	02-003A	SKYDROL 500 B/4	F	NSA-307-110 Type 4		US-76541 N-F1048
R			D	None		
			GB	None		
R			USA	None		
			C	Z-20.209		
	OR					
	02-003B	SKYDROL LD4	F	NSA-307-110 Type 4		
			GB	None		
			USA	BMS-3-11F		
	OR					
	02-003C	HYJET IV - A	F	NSA-307-110 Type 4		N-F2429
			D	None		US-29700
			GB	None		
			USA	None		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
OR 02-003D	HYJET IV-A PLUS				
02-003E	HYJET V	F	NSA-307-110	lower density hydraulic fluid	N-F3528 N-F3980 N-ZS996

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SOPLR
02-004	CASTROLAERO	F	None	Shock Absorber	Local
	35	D	None	Damper/Lubricant	Purchase
	Shock	GB	None	Fluid	
	Absorber	USA	None		
OR	Fluid				
02-004A	AEROSHELL	F	None	Shock Absorber	Local
	SSF	D	None	Damper/Lubricant	Purchase
	Shock	GB	None	Fluid	
	Absorber	USA	None		
OR	Fluid				
02-004B	ROYCO SSF	F	None	Shock Absorber	Local
	Shock	D	None	Damper/Lubricant	Purchase
	Absorber	GB	None	Fluid	
OR	Fluid	USA	None		
02-004C	HYDRAUNYCOIL	F	None	Shock Absorber	Local
	FH 6 AW	D	None	Damper/Lubricant	Purchase
		GB	None	Fluid	
		USA	BMS 3-32 TYPE 1		
02-005	LUBRISOL 1395	F	None	Additive to landing	Local
		D	None	gear shock absorber	Purchase
		GB	None	fluid to reduce wear	
		USA	None		
02-006	AEROSHELL LGF	F	None	Alternative to 02-001	Local
		D	None	for landing gear	Purchase
		GB	None	shock absorber fluid	
		USA	BMS 3-32 Type 2		
02-006A	ROYCO LGF	F	None	Alternative to 02-001	Local
		D	None	for landing gear	Purchase
		GB	None	shock absorber fluid	
		USA	None		
02-006B	CASTROLAERO	F	None	Alternative to 02-001	Local
	40	D	None	for landing gear	Purchase
		GB	None	shock absorber fluid	
		USA	BMS 3-32 Type 2		

3. Oils

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
03-001	MINERAL OIL	F	None	General purpose, low temperatures	Any Petrol Company N-F4101 US-92895
		D	None		
		GB	DEF-STAN 91-47		
		USA	MIL-L7870		
		C	Z-21.118		
OR					
03-001A		F	None		LOCAL PURCHASE
		D	None		
		GB	CS 3118		
		USA	VV-L-800		
		C	Z-21.119		
03-002	LUBRICATING OIL TURBINE ENGINE SYNTHETIC BASE	F	None	APU and AC generator	N-F3528 N-F3980 US-19135
		D	None		
		GB	DERD-2499		
		USA	MIL-L-23699		
		C	Z-21.101		
03-003	LUBRICATING OIL TURBINE ENGINE SYNTHETIC BASE	F	None	Flaps and slats. Control unit gearboxes and trimmable horizontal stabilizer (THS) screw jack gearbox	N-F3528 N-F4101 US-29700
		D	None		
		GB	None		
		USA	MIL-L-7808		
		C	Z-21.102		
03-004	INFORMATION TRANSFERED TO 03-004A				
OR					
03-004A	LUBRICATING OIL ESSO 2120A	F	None	SLAT FRICTION brake	1PWD8
		D	None		
		GB	None		
		USA	None		
		OTH	None		
03-005	Obsolete, to be replaced by item No. 02-001				
03-006	SHELL TONNA S220	F	None	Lubricating Oil	N-U1553 US-54527
		D	None		
		GB	None		
		USA	None		
03-007	UNIVIS P-12 SYNTHETIC OIL	F	AIR 3511	Flight control lubricating	N-F3528 N-K1274 US-29700
		D	None		
		GB	DEF-STAN 91-49		
		USA	MIL-L-6085		
		C	Z-21.103		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
03-008	OIL (Fuel Control Preservation)	F	AIR 3516	Preservation - Fuel System of APU	N-F4101
		D	None		US-98308
		GB	None		
		USA	MIL-L-6081		
		C	Z-21.113		

4. Common Greases

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
04-001	MINERAL GREASE MIL-G-3545	F	AIR 4205	High temperature grease for bushes, ball bearings and roller bearings	Any Petrol Company
		NAT	G-359		
		D	NONE		
		GB	NONE		
		USA	NONE		
04-002	GRAFITED MINERAL GREASE	F	AIR 4206	General purpose. Grease containing 5% graphite	Any Petrol Company N.M 2028
		D	None		
		GB	DEF STAN 91-54		
		USA	NONE		
			NONE		
04-002A	OBSOLETE TO BE REPLACED BY ITEM No. 04-027				
04-002B	OBSOLETE TO BE REPLACED BY ITEM No. 04-028				
04-003	GRAPHITED PETROLATUM THREAD COMPOUND	F	AIR 4247	Anti-seize grease for threads, ftgs and nuts 50% mineral jelly + 50% graphite	Any Petrol Company N-F4101 US-84180
		D	None		
		GB	DEF-STAN 80-80		
		USA	MIL-T-5544		
		C	Z-21.216		

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
04-004	SYNTHETIC GREASE (high press)	F	AIR 4210	Instruments and actuator rods. Low and high tempera-tures	Any Petrol Company
		D	NONE		
		GB	DF.ST-91-53		
		USA	MIL-G-23827		
		C	Z-21.201		
OR					
04-004A	INFORMATION TRANSFERRED TO 04-022				
OR					
04-004B	SYNTHETIC GREASE (high press)	F	NONE	Instruments and actuator rods. Low and high tempera-tures	Any Petrol Company
		D	NONE		
		GB	NONE		
		USA	MIL-G-23827		
04-005	SYNTHETIC GREASE WIDE TEMPERATURE	F	AIR 4207	General purpose. Wide temperature range.	Any Petrol Company N-F4101
R		D	None		
R		GB	None		
R		USA	MIL-G-25760		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
04-005A	Item not used				
04-006	GREASE, GASOLINE AND OIL RESISTANT	F D GB USA NAT C	AIR 4214 None DEF-STAN 91-6 MIL-G-6032 Type I G-363 Z-21.207	Grease : fuel and oil resistant	Any Petrol Company N-F4101 US-79030
04-007	INFORMATION TRANSFERRED TO 06-016				

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
04-008	LUBRICANT O-RING ROYCO 825 (Ex HF-825)	F	None	O-ring Lubricant	US-07950
		D	None		
		GB	None		
		USA	None		
OR 04-008A OR 04-008B OR 04-008C				No longer available Replaced by Item No. 04-008	
04-009	COPASLIP	F	MES-C87-6660 639/9	Lubrication of bleed air precooler attaching parts	N-F5888
		D	None		
		GB	None		
		USA	None		
04-010	GREASE BALL + ROLLER BEARING	F	None	High temperature grease	Any Petrol Company US-07950
		D	None		
		GB	DEF-STAN 91-55		
		USA	MIL-G-25013		
		NAT	G-372		
		C	Z-21.203		
04-011	SILICONE GREASE	F	None	Rubber to metal lubrication	N-F3102 N-K7750 US-94499
		D	None		
		GB	None		
		USA	MIL-G-4343		
		NAT	G-392		
		C	Z-21.214		
04-013	ANTI-FRETTING GREASE	F	None	Anti-fretting grease	N-F1858 N-F4101 N-K5591
		D	None		
		GB	DEF-STAN 91-51		
		USA	MIL-G-25537		
		NAT	G-366		
		C	Z-21.218		
04-014	FEL-PRO C5-A	F	None	High temperature compound	N-F0438 US-73165
		D	None		
		GB	None		
		USA	MIL-A-907		
		C	Z-21.902		
OR 04-014A	NEVER SEEZ STANDARD	F	None		N-F6712 US-15145
		D	None		
		GB	None		
		USA	MIL-A-907		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	04-015	MCS-352	F	None	THS actuator	N-F4101
			D	None	hydraulic tube	US-76541
			GB	None	installation.	
			USA	BAC 5001	Seals, back up rings,	
				DACO 5073	hydraulic assembly lube	
			C	Z-21.117		
	04-016	EXXON 5182	F	None	Grease for high tempe-	N-F3528
			D	None	rature areas	US-29700
			GB	None		
			USA	None		
	04-017	SILICONE GREASE	F	None	Lubrication of slat	N-F3102
			D	None	track shutter rollers	N-K7750
			GB	None	and springs	US-94499
			USA	MIL-G-46886		
R	OR					
R	04-017A	MOLYCOTE 33M	F	None	Lubrication of slat	LOCAL
R			D	None	track shutter rollers	PURCHASE
R			GB	None	and springs	
R			USA	None		
	04-018	OPTIMOLY PASTE	F	None	Flap/Slat transmission	OPTIMOL
		WHITE T	D	None	shaft splines and flap	57607
			GB	None	down drive shaft	FORBACH
			USA	None	primary and secondary	(FRANCE)
					splines	*1100
						*1170
	04-019	MINERAL GREASE	F	AIR 4215	General use	Any
			D	None	normal temperature	Petrol
			GB	DEF-STAN 91-12		Company
			USA	None		
			NAT	G-382		
	04-020	GREASE	F	None	Anti-seize grease	Any
			D	None		Petrol
			GB	None		Company
R			USA	MIL-PRF-83483		LOCAL
R						PURCHASE
	04-021	Information transferred to item No. 05-002				
	04-022	SYNTHETIC	F	AIR 4222	WING LEADING	Any
		GREASE	GB	DEF-STAN-91-52	edge Area	Petrol
		HIGH PRESSURE	USA	MIL-PRF-81322	lubrication LANDING	Company
				GRADE 2		
			NAT	C-395	GEAR lubrication	N-F4101
			C	Z-21.202		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
04-023	GREASE-FUEL AND OXIDISER RESISTANT	F	None	APPLIED to O-Rings between actuator and transfer valve drive	LOCAL PURCHASE
		D	None		
		GB	None		
		USA	MIL-G-27617		
		C	Z-21.204		

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R	04-024	ARMNA G4789	F	None	Flap and slat system	N-U1757
R		(Synthetic	D	None	lubrication in case of	NZ-ET342
R		Grease)	GB	None	mixing with claygrease	US-06PS1
R			USA	None	follow the rule of	
R					SIL 12-008	
	OR					
	04-024A	INFORMATION				
		TRANSFERRED TO				
		04-004				
	OR					
R	04-024B	NYCO GREASE	F	None	In case of mixing with	N-F4101
R		GN 144	D	None	claygreace follow the	
R			GB	None	rule of SIL 12-008-	
R			USA	None	AIMS 09.06.001 no	
R			AIB	AIMS 09.06.001	longer to be used	
	OR					
R	04-024C	Information transferred to item No. 04-024				
	04-025	ZFB 831	F	None	Lubricant, semifluid	N-K0648
		Lubricant	D	None	for rotary actuator	
		semi fluid	GB	None	lubrication	
			USA	None		
	OR					
R	04-025A	OPTIMOL	F	None	No longer available	N-D5740
		AEROPLEX ZF1	D	None		
			GB	None		
			USA	None		
			C	None		
	OR					
	04-025B	ROCOL AEROSPEC	F	None	Lubricant, semifluid	N-C5543
		100	D	None	for rotary actuator	
			GB	None	lubrication	
			USA	None		
			C	None		
	OR					
	04-025C	TURMOGREASE	F	None	Lubricant, semifluid	N-C5543
		LI AZR	D	None	for rotary actuator	
			GB	None	lubrication	
			USA	None		
			C	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	04-026	Obsolete, to be replaced by item No. 04-004				
	04-027	MIL-G-21164 diester-based grease with molybdenum disulfide	F D GB USA NAT C	AIR 4217 None DEF-STAN 91-57 MIL-G-21164 G-353 Z-21.209	General Purpose	LOCAL PURCHASE
	04-028	Mineral oil-based grease with molybdenum disulfide	USA	MIL-G-23549	General Purpose	LOCAL PURCHASE
	04-029	UNIMOLY GL82 GREASE	F D GB USA	None None None None	Shall be used for the lubrication of the threads of screws	*910
	04-030	ROYCO C-201	F D GB USA	None None None None	High temperature fluorosilicone grease	US-07950
	04-031	MOLYKOTE 44 MIDIUM	F D GB USA	None None None MIL-L-15719	Installation of seals/ O-rings	N-K7750
	04-032	DOW CORNING HIGH VACUUM GREASE	F D GB USA	None None None None		US-71984
	04-033	ISOFLEX PDL 300 A	F D GB USA	None None None None		N-D8375
R	04-034	Information transferred to item No. 04-014A				
	04-037	AEROSHELL GREASE 33	AIB USA	AIMS 09-06-002 AMS 3052	MULTIPURPOSE AIRFRAME GREASE	N-F1858
R	OR					
R	04-037C	MOBILGREASE 33	AIB USA USA NAT	AIMS 09-06-002 AMS 3052 MIL-PRF-23827 TYPE I	MULTIPURPOSE GREASE	N-F3525 US-OTS34
R	OR					

	ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
R	04-037D	NYCO GREASE GN 148	AIB AIMS 09-06-002 AIB IPS09-06-002-04 US AMS 3052	MULTIPURPOSE GREASE	N-F4101

5. Special Materials

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-001	Insulating and Sealing Grease Silicone MS4	F	None	Metal/Metal Sealing against humidity	N-F3102
		D	None		N-K7750
		GB	DEF.STAN-59-10		US-94499
		USA	SAE-AS8660		
		C	Z-16.315		
OR					
05-001A	RHODORSIL B-431	F	None		N-F0107
		D	None		
		GB	DEF-STAN 50-10		
		USA	SAE-AS8660		
OR					
05-001B	INSULATING AND SEALING GREASE SILICONE	F	None		US-01139
		D	None		US-94499
		GB	None		
		USA	SAE-AS8660		
05-002	MASTINOX 6856K	F	None	Anti-corrosion compound	N-F1419
		D	None		N-K2232
		GB	None		N-K5635
		USA	MIL-P-8116		
		C	Z-11.903		
OR					
05-002A	INFORMATION TRANSFERRED TO 05-002				
05-002C	TITANINE JC5A	F	None	Anti-corrosion compound	N-K5635
		D	None		
		GB	DTD 5604		
		USA	None		
R OR					
R 05-002D	CHROMATE FREE GENERAL PURPOSE CA1000	F	AIMS 04-05-005 Type 1	No hardening jointing compound non chromated	US-85570 N-K5635
R		D	None		
R		GB	None		
R		USA	None		
05-003	OBSOLETE TO BE REPLACED BY ITEM 05-003B				
OR					
05-003A	Item not used				
OR					
05-003B	KRYTOX 240AC	F	None	Thread lubrication on oxygen system components	US-5P414
		D	None		
		GB	None		
		USA	MIL-G-27617		
		C	Z-21.204		

ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
05-004	GC1 and GC2 SOLUTION	F None D None GB None USA MIL-L-25567 Type I	Detection of oxygen leaks	N-F0553 US-23316
OR 05-004A	SHERLOCK 5			
OR 05-004B	MIL-L-25567 OPEN	F None D None GB None USA MIL-L-25567 Type I	Oxygen leak detector	LOCAL PURCHASE
05-005	TECTYL 502C	F AIR 8132 D None GB None USA MIL-C-16173 grade II	Corrosion preventive (Obsolete use 15-007)	N-F5205 US-86024
OR 05-005A	Information transferred to item No.15-007			
OR 05-005B	Information transferred to item No.15-004			
OR 05-005C	Item not used			
OR 05-005D	Information transferred to item No.15-007			
OR 05-005E	Information transferred to item No.15-007			
05-006	JENOLITE RRN-1	F None D None GB None USA None	Corrosion preventive	N-F6541 N-K4859

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-008	FAKOPOL	F	None	Paste for polishing	N-D9118
		D	None	plexiglas (Coarse	
		GB	None	grade)	
		USA	None		
05-009	PLASTIC	F	None	Paste for polishing	N-D9118
	POLISHING	D	None	plexiglas (Fine grade)	US-71361
		GB	None		
		USA	PP-560		
		C	Z-24.195		
05-010	PLASTIC	F	None	General use see 11-017	LOCAL
	CLEANER	D	None	Carpet : see 11-018	PURCHASE
		GB	None	Cabin window :	
		USA	None	see 11-019	
				screen : see 11-020	
05-011	Item not used				
05-012	Information transferred to item No. 05-010				
05-013	QZ-11B	F	None	Release agent (For	N-F4364
		D	TV-53-3507/73	Panel removal)	N-S3798
		GB	None	(Obsolete use	US-02684
		USA	None	05-013A)	
		C	Z-24.223		
OR					
05-013A	QZ-5111	F	None	Release agent (For	
		D	None	panel removal)	
		GB	None		
		USA	None		
		C	Z-24.223		
05-014	Item not used			Transferred to 08-060	
OR					
05-014A	Item not used				

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-015	Item not used			Transferred to 08-061	
OR					
05-015A	Item not used				
OR					
05-015B	Item not used				
OR					
05-015C	Item not used			Transferred to 08-061A	
05-016	Item not used			Transferred to 19-002	
05-017	HYLOMAR SQ-32M	F	None	Jointing compound	N-K3237
	or SQ-32L	D	None		US-13029
		GB	DTD-900/4586/A		
		USA	None		
05-018	Item not used			Transferred to 08-062	
OR					
05-018A	Item not used				
05-019	TECTYL 506	F	None	For seat tracks	N-F5205
		D	None	Corrosion preventive	US-86459
		GB	None	(obsolete use 15-008)	
		USA	MIL-C-16173		
			Grade IV		
OR					
05-019A	TECTYL 846	D	None		
		USA	MIL-C-16173		
			Grade IV		
OR					
05-019B	Item not used				
OR					
05-019C	PROTEX 1619	F	None	Corrosion protective	N-F2756
		D	None	treatment	
		GB	None		
		USA	MIL-C-16173		
OR				Corrosion preventive	
05-019D	RUST BAN 397			(obsolete use 15-008)	N-F3528
OR					
05-019E	AEROSHELL 01				N-F1858
OR					
05-019F	Item not used				
OR					
05-019G	ARDROX 3140	F	None	Corrosion preventive	N-C1308
		D	None	(Obsolete use 15-008)	N-F3082
		GB	None		US-17209
		USA	MIL-C-16173		US-59003
			Grade IV		

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	05-020	FLUOROCARBON 211	F	None	Release agent	US-18598
			D	None		
			GB	None		
			USA	MIL-L-60326 Type I		
	OR					
R	05-020A	FLUOROCARBON MS-122			Release agent No longer manufactured	
	OR					
	05-020B	Item not used				
	OR					
	05-020C	Use item 05-064				LOCAL PURCHASE

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-021	OPEN WEAWE 250	F	None	Locked glass	*1010
		D	None		N-K4411
		GB	None		MARGLASS
		USA	None		68000 COLMAR
05-022 OR 05-022A	Item not used			Transferred to 08-063 / Transferred to 08-063A	
05-023	MELINEX FOIL	F	None	Polyterepthalate (Door-seal repair)	N-F0276
		D	None		
		GB	None		
		USA	MIL-I-631		
OR 05-023A	POLYTEREPTHALATE	F	None	Door seal repair	LOCAL PURCHASE
		D	None		
		GB	None		
		USA	MIL-I-631		
05-024	P-R-F-91	F	None	Fabric (Door-seal repair)	N-F0276
		D	None		
		GB	None		
		USA	None		
05-025	TURCO 1495	F	None	Abrasive polish for scratches in aluminium	N-F3172
		D	None		N-D8908
		GB	None		US-61102
		USA	MIL-P-6888		
OR 05-025A	JET POLISH K 0601	F	None		N-F5380
		D	None		
		GB	None		
		USA	None		
OR 05-025B	ALUMINUM OXYDE 5600 R	F	None		US-51686
		D	None		
		GB	None		
OR 05-025C	ALUMINUM OXYDE	USA	MIL-P-6888 Type I		LOCAL PURCHASE
05-026	Information transferred to item No.05-019				

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	05-027	ROCKET WD-40	F	None	Corrosion preventive	N-F3259
			D	None	moisture remover	US-09137
			GB	None	lubricant	
	OR		USA	MIL-L-81309		
	05-027A	ARDROX 396/1			Rust inhibitor	N-C1308
					(obsolete use 15-004)	N-F3082
						US-59003
	OR					
	05-027B	Information transferred to item No. 15-005A				
	OR					
	05-027C	Information transferred to item No. 15-004				
	OR					
	05-027D	BOESHIELD T-9	F	None	Corrosion preventive	*1480
			D	None	moisture remover	N-F0668M
			GB	None	lubricant	SUREFILM
			USA	MIL-L-81309	Rust inhibitor	LUBRIC.
						SEOUL
						KOREA
	OR					
	05-027E	PROTEX R-09	F	None	Corrosion preventive	N-F2756
			D	None	moisture remover	
			GB	None	lubricant	
			USA	MIL-L-81309	Rust inhibitor	
					(Obsolete use 15-005)	
	OR					
	05-027F	DINITROL AV 5	F	None		N-C7223
			D	80-T-35-9799		N-S5611
			GB	None		
			USA	MIL-C-16173		
	OR					
	05-027G	Steelgard or	F	Air - 3634		*1150
		parcofilm 303	D	None		N-F1705
			GB	None		N-U1478
			USA	MIL-L-81309		
	05-028	Information transferred to item No.05-025				
R	05-029	BSB DUROFIX	AIB	ASN-B 70830	Immersion of BSB label	N-F8808
R		FIXATIV UW	D	None		
R		SPECIAL	GB	None		
R			USA	None		
	05-030	Information transferred to item No.05-029				
	05-031	Information deleted				
	05-032	E-100-B	F	None	Protection of cabin	N-U0166
		SPRAYLAT	D	None	Window Panel during	

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
			GB	None	repair Work	
			USA	MIL-C-6799 Type II Class A		
R	05-033	GLASSCLOTH 91111	F	None	Transfer to CML 20-039	N-D2436
R			D	None	MIL-C-9084 Class 2	
R			GB	None	Type III inactive	
			USA	MIL-C-9084 Type III		
			C	Z-17.201		
R	OR					
R	05-033A	GLASSCLOTH FOR LAMINATES PROD STYLE 120	F	None	Transfer to CML 20-039	LOCAL
R			D	None	SPEC MIL-C-9084	PURCHASE
R			GB	None	Class 2 Type III	
R			USA	MIL-C-9084 Type III	inactive	

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-034	PVAC-APPRETAN POLYVINYLACETAT	F	None	Surface protection for repaired areas on Abskyn components	N-D2200
		D	None		
		GB	None		
		USA	None		
05-035	RIGID FOAM SHEET	F	None	Honeycomb repairs	N-C3346
		D	DAN 138		DIAB
		GB	None		HANNOVER
		USA	None		GERMANY
05-036	Item not used			Transferred to 08-064	
05-037	Information deleted				
05-038	D-70 (POWDER)	F	None	Removal of skydrol spillage	N-C7058
		D	None		
		GB	None		
		USA	None		
OR 05-038A	Item not used				
OR 05-038B	ARDROX 9D-1 (POWDER)	F	None	Removal of skydrol spillage	N-C1308
		D	None		N-F3082
		GB	None		US-17209
		USA	None		US-59003
OR 05-038C	CLAY POWER	F	None	Absorption of spillage	
		D	None		
		GB	None		
		USA	None		
OR 05-038D	VERMICULITE	F	None	Absorption of spillage	
		D	None		
		GB	None		
		USA	None		
05-039	Information transferred to item No.05-005				
05-040	Item not used			Transferred to 08-065	
05-041	TURCOAT 4786	F	None	Material for phospha-tisation	N-D8908
		D	None		
		GB	None		
		USA	DOD-P-16232		
			TT-C-490 Type I		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
R	05-042	Information transferred to item No. 05-042B				
	OR					
R	05-042A	ARDROX 1218	USA	MIL-C-10578 Type III	No longer available	N-C1308 N-F3082 US-17209 US-59003
	05-042B	ELDORADO AC-182	F D GB USA	None None None MIL-C-10578 Type II	Cleaning and corrosion removal of low alloyed	C7884 FAPE3
	05-043	KLINGERFLON (P.T.F.E SPRAY)	F D GB USA	NT-10006 None None None	To spray threads of ballend during assembly	N-K0076
	OR					
	05-043A	FLUOROGLIDE (P.T.F.E SPRAY)				*06040 FLUORO-PLAST ARGENT-EUIL 95103 FRANCE US-18632
	OR					
	05-043B	SPRAY TEFLON TYPE 2000 OR TYPE 6044/6040	F D GB USA	None None None None	Dry film lubricant	N-F6372
	05-045	FLUORESCENT DYE PIGMENT T100/ OS-31 (INTENSE GREEN DYE)	F D GB USA	None None None None	Vacuum/dye leak checks	US-83328
	OR					
	05-045A	FLUORESCENT DYE PIGMENT T100/ OS-80 (BLUISH WHITE DYE)				
	OR					
	05-045B	FLUORESCENT DYE PIGMENT YELLOW 131 SC			Fuel leak detection	-1261 FA1C0
	05-046	AUTOMATE BLUE	F	None	Vacuum/dye leak check	*1060

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	SF (BLUE DYE)	D	None	procedures	N-K7996
	(NO LONGER	GB	None	(obsolete use 05-046B)	US-32063
	AVAILABLE)	USA	None		MORTON
OR					CHIMIE
05-046A	AUTOMATE RED				PARIS
	SF (RED DYE)				
	(NO LONGER)				
	AVAILABLE)				
OR					
05-046B	AUTOMATE YELLOW	F	None	Vacuum/dye leak check	
	8SF	D	None	procedures	
		GB	None		
		USA	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	05-047	MASTINOX D40	F	None	Anti-corrosion	N-F1419
			D	None	compound	N-K2232
			GB	None		
			USA	None		
			C	Z-11.904		
	05-048	SYNTHETIC	F	None	Packing between floor	N-C0419
		RUBBER STRIP	D	LN-9108-D3-2	panels and floor	
			GB	None	supports	
			USA	AMS 3204		
	OR					
	05-048A	SYNTHETIC	F	None	Packing between floor	LOCAL
		RUBBER LOW	D	None	panels and floor	PURCHASE
		TEMP. RESISTANT	GB	None	supports	
			USA	AMS 3204		
	05-049	FLUID CHILLER	F	None	Galley cooling	CHEMIKA-
		COOLANT	D	TV-25/3735/80		LIEN
			GB	None		6340-DI
			USA	None		LENBURG
R	05-050	GLASSCLOTH	F	None	Transfer to CML 20-044	*0315
R			D	None	MIL-C-9084 Type V	N-D8274
R			GB	None	inactive	
			USA	MIL-C-9084		
				Type V		
	05-051	Information transferred to item No. 08-078				
	OR					
	05-051A	Information transferred to item No. 05-051				
	OR					
	05-051B	Information transferred to item No. 08-078				
	05-052	PVC DISKS 5440	F	None	Blanking of hoisting	*0120
		GS (GREY) OR BC	D	None	points	ADHESIFS
		(WHITE)	GB	None		& TECH
			USA	None		65 000
						TARBES
	05-053	BTF-427	F	None	Bond tester coupling	N-H2763
			D	None	fluid	
			GB	None		
			USA	None		

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-054	Information transferred to item No.05-002				
05-055	MIRROR GLAZE MGH 10 PLASTIC POLISH	F D GB USA	None None None MIL-C-18767	Polish navigation light lens	N-U3230 US-12849
05-056	GLASSCLOTH 92110	F D GB USA	None WLB-8-4548/60 None None	Structural repair of composite components	N-D2436
05-057	MICROBALLOONS BJO-0930	F D GB USA C	None None None None Z-18.903	Nonstructural repair of composite components	N-2D097
05-058	RMP SPECIAL SIZE No. 20	F D GB USA	None None None MIL-G-5634 Type V	Compressor cleaning by introduction of material into engine intake when running	ABRASIVE CALIF. 94577 US-3G968
05-059	Information transferred to item No. 05-027F				
05-060	GLASSCLOTH 827	F D GB USA	None None None None	Viton-impregnated glasscloth (Vapor-seal repair)	N-F2538

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	05-061	GLASSCLOTH 3V1R20	F	None	Coated glasscloth (Vapor-seal repair)	N-F0582
			D	None		
			GB	None		
			USA	None		
	or					
	05-061A	GLASSCLOTH 3 NX1R20	F	None	Coated glasscloth (vapor seal repair)	N-F0582
			D	None		
			GB	None		
			USA	None		
	05-062	THERMO SHRINKABLE VITON (RK6014)	F	None	Fire Plug Sealing	N-F6220
			GB	AFS 2145		N-K1010
			USA	MIL-I-46846		
	05-063	NEVERSEEZ NICKEL SPECIAL GRADE NS165	F	NONE	Lubrication of Leading Edge Slat Pinions Assemblies	N-U2215
			D	NONE		
			GB	AFS 1836		
			USA	NONE		
	05-064	SODIUM ALGINATE +ETHYL GLYCOL +WATER (HOT) RELEASE AGENT	F	NONE	In Bores for the Flap Actuator-Lever Bearing-Housings-Propor. by weight: Sod.Algi.: 4GR Ethy Gly.: 2GR Water : 94GR	*0900 KELCO LONDON ENGLAND
			D	NONE		
			GB	BAEP 9075		
			USA	NONE		
R	OR					
R	05-064A	RELEASE AGENT/ WATER BASED			Release agent	US-1QXN9

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
R	05-065	SCOTCH SJ 8671	F	NONE	Erosion Protection	*04963
R			D	NONE	Tape Preferred anti	
R			GB	NONE	erosion topics	
R			USA	NONE	CML 05-132	
			C	Z-24.380		
	05-066	Information transferred to item No.08-005C				
	05-067	ECCOSPHERE R OR	F	None	Viscosity control for	EMERSON
		FTD 146	NL	TH 5.664	RT adhesives and void	& CUMING
			GB	None	fillers	N-B1152
			USA	None		*0545
	OR					
	05-067A	IG 101				US-61158
						US-65760
	OR					
	05-067B	AMS 3751	F	None	Thickening Agent	LOCAL
			D	None	(Glass microballoons)	PURCHASE
			GB	None		
			USA	None		
	05-068	CAPRAN 512 H	F	None	Vacuum bag. max use	ALLIED
			D	80-T-31-2910	temp. 200 deg.C (392	FIBER
			GB	None	deg. F). Min. temp use	MORRIS-
			USA	None	-61 deg.C (-78 deg. F)	TOWN
						*0134
	OR					
	05-068A	HS-8171				RICH-
						MOND
						CALIF.
						*1270

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	05-069	SM 5144 (SERIES 5100)	F	None	Vacuum bag sealant	US-2Y445
			D	None		US-53309
			GB	None		
			USA	None		
	05-070	IRIDITE 14-2	F	None		US-99442
			D	None		
			GB	None		
			USA	None		
			C	Z-23.401		
	05-071	GUPOFLEX 301	F	None	Leak detection (Vapor Seal, etc...)	GUPO KEHL/ RHEIN GERMANY *0760
			D	None		
			GB	None		
			USA	None		
	05-072	GILL FAB 6167 - 016905 OR 6367 - 016905	F	None	Compartment linings repair	M.C GILL EL MONTE USA *0960
			D	None		
			GB	None		
			USA	None		
	05-073	GILL FAB 6167-030907 OR 6367-030907	F	None	Compartment linings repair	M.C. GILL EL MONTE USA *0960
			D	None		
			GB	None		
			USA	None		
	05-074	AERFILM LHR-HA211 OR AERFILM LHR-PS-LHR	F	None	Interior Trim	SCHNEL- LER INC. OHIO USA *01390
			D	DAN 1274		
			GB	None		
			USA	None		
			C	Z-22.915		
R	05-075	ROHACELL 71WF	F	ASNA 4335	Foam-dry before bonding	ROHM - GMBH DARMSTAD GERMANY ROHM-USA *1265
			D	LN 29898		
				DAN 1215		
			GB	None		
			USA	None		
			C	Z-14.602		
R			C	Z-14.608		*1365
R			AIB	ABS 5318A		N-C7210
R			AIB	AIMS 04-11-002		
R			AIB	ASNA 5072		
R	05-076	FAA PWDR KCL103 +LACTOSE	F	None	Smoke test in lavatories Item No. 19-023	*1034 FAPE 3
R			D	None		
R			GB	None		

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R			USA	None	preferred alternative	
R					Make a mixture of each	
R					50 % KC3 and lactose	

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
05-077	BRAYCOTE 248	F	None	O-ring lubrication	CASTROL
		D	None		IRVINE
		GB	None		CALIFORN
		USA	MIL-C-11796		USA
		C	Z-11.114		*0307
05-078	MIL-O-27210 Open oxygen	F	None	Aviator's breathing oxygen	LOCAL PURCHASE
		D	None		
		GB	None		
		USA	MIL-O-27210		
05-079	STEWART PATCH FIELD KIT SP-RO3O-66	F	None	Cargo compartment linings repair	*1470
		D	None		
		GB	None		
		USA	None		
05-080	231230, 231231 AND 231255 Click-patch kit	F	None	Temporary repair of fuel leaks at fasteners/rivets	US-83574
		D	None		
		GB	None		
		USA	None		
05-081	JEHIER 865	F	ASNB-82510	Repair vapor seal	N-F2538
05-082	XA FRT 3000 Polyethylene foam, self-adhesive	F	None	Repair of DADO panels	*2300
		D	DAN 381K08		
		GB	None		
		USA	None		
05-083	F X 6 with hot melt adhesive HAA 1990 decorative foil	F	None	Application of decoration sheets	*1245
		D	DAN 1274 part 1		
		D	DAN 419		
		GB	None		
		USA	None		
05-084	AIRDEC F3OFF with hot melt adhesive HA3931 decorative foil	F	None	Application of decoration sheets	*0790
		D	DAN 1274 part 1		
		GB	None		
		USA	None		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
05-085	NOMEX HONEYCOMB	F	None	Pax compartment repair	*0320
		D	LN29967		*0570
		GB	None		*0770
		USA	None		*1400
05-086	TR 6/2 SK polyethylene foam	F	None	Repair of dado panel	*2300
		D	DAN 381H08		
		GB	None		
		USA	None		
05-087	Information transferred to item No.20-007				
05-088	F3T-282 or G814NT or W-5-322 Carbon Fiber Dry Fabric	F	None	Repair of carbon fiber parts for cosmetic repairs	N-F2991
		D	None		N-F5123
		GB	None		US-OLHZ4
		USA	None		
		C	Z-17.225		
05-089	Information transferred to item No.20-031				

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-090	Epocast 1616A/B Epoxy resin	F	None	Resin for filling and closing honeycomb repairs	N-D8274
		D	None		N-F2605
		GB	None		N-K1007
		USA	None		US-99384
		C	Z-18.146		
05-091	VICOTEX 913/46/G814NT Carbon Fiber Fabric Prepreg	F	None	Composite repair	N-F5123
		D	None		
		GB	None		
		USA	None		
		C	Z-19.722		
05-092	CYCOM 919-39-3KHS-P-193 Carbon Fiber Fabric Prepreg	F	None	Composite repairs	*0405
		D	None		
		GB	None		
		USA	None		
		C	Z-19.720		
05-093	MARBOCOTE TRE 45 Release agent	F	None	Used for door scuff plates	*0950
		D	WQ10142		*1515
		GB	None		
		USA	None		
or 05-093A	FREKOTE 700-NC Release Agent	F	None	Tedlar repair on the elevator leading edge access covers	US-33564
		D	None		
		GB	None		
		USA	None		
		C	Z-24.224		
05-094	TURCOT PRETREAT Heat treat scale inhibiting compound	F	None	Minimize tenacious scale and reduce oxidation	N-D8908
		D	80-T-35-0109		US-61102
		GB	None		
		USA	None		
05-095	TURCO 4104 Pickling solution	F	None	Acid additive for nitric acid pickling bath	N-D8908
		D	80-T-35-0104 or		US-61102
		D	80-T-35-0106		
		GB	None		
		USA	None		
05-096	SCOTCH 8681-HS COLOR 36320 Polyurethane adhesive tape	AIB	AIMS 04-12-001	Erosion protection for HTP leading edge	US-52152
		C	Z-24.283		
05-097	Information transferred to item No. 08-090				

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-098	ANHYDROUS COPPER SULPHATE Anhydrous copper sulphate crystals	F D GB USA	None None None None	Test for water	LOCAL PURCHASE
05-099	ELECTOLIT 342	F D GB USA	None None None MIL-P-8116	To promote electrical conductivity and inhibit corrosion between light alloy faying surfaces	N-C2155
05-100	AL-016-CX	F D GB USA C	None None None None Z-22.909	THS, TIP5 surface cosmetic repair	OKWM1 072E8
05-101	Information transferred to item No.20-008				
05-102	STAINLESS STEEL YARN SFY 750	F D GB USA	None None None None	Used to stitch tears to insulation muffs (used between ducts)	N-K8319
05-103	GLASS/VITON Material GV 005/4	F D GB USA	None None None None	Used to patch bestobell muffs and insulation seals	N-K8319
05-104	POLYMERIC YARN 681711	F D GB USA	None None None None	Used to stitch tears in bestobell insulation seals	N-K8319
05-105	Information transferred to item No.20-010				
05-106	HRH 10/0X-1/4-3.0 or HMX-1/4-3.0 or ECA-R-6.4-48	F D GB USA SP	None None None None I+D-P-176 Class I Type II	Repair of the main landing gear door	N-S3970 0GE45 07CD0 US-51344
05-107	Information transferred to item No.20-012				
05-108	HRH 10/0X-3/16-1.8 or HMH-3/16-0X-1.8	F D GB	None None None	Repair of the elevator inboard cap	0GE45 07CD0 US-51344

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	or ECA-R-4.8-29	USA	None		
		SP	I+D-P-176		
			Class I Type II		
		C	Z-17.631		

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
05-109	AIRVOLT Laminate 1C-120B or 1C-180B	F	None	Replacement of cargo linings	*0790 US-53370
		D	DAN 493		
		GB	None		
		USA	None		
05-110	GILL FAB 1367E Class 2 Grade A Type 50 or Type 70	F	None	Replacement of cargo linings	*0960
		D	None		
		GB	None		
		USA	BMS 8-223		
05-111	NITRIC ACID	F	None	As a constituent in solution used for passivation of stainless steel	Local purchase
		D	None		
		GB	None		
		USA	None		
05-112	SODIUM DICHROMATE	F	None	As a constituent in solution used for passivation of stainless steel	Local purchase
		D	None		
		GB	Nnne		
		USA	None		
		C	Z-23.546		
05-113	H500-WF	F	None	Paste used to recondition fuel sealing valve by lapping a poppet valve With its seat	N-U8379
		D	None		
		GB	None		
		USA	None		
05-114	SOLVEL METAL POLISH	F	None	Metal polish used to recondition fuel sealing valve by lapping a poppet valve with its seat	*0150
		D	None		
		GB	None		
		USA	None		
05-115	MASTINOX 6856H	USA	MIL-P-8116B	Assembly	K5635
05-116	Q73 PTFE TAPE FOR CABLE REPAIRS	F	None		F0226
		D	None		
		GB	None		
		USA	None		
05-116A	P-412 PTFE THREAD SEALANT TAPE	F	None		F0226
		D	None		
		GB	None		
		USA	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	05-117	Information transferred to item No.20-023				
	05-119	Information transferred to item No.20-023				
	05-120	FORALKYL 2211 RAIN-REPELLENT	F	AIMS 09-09-000		N-F0218
			D	None		
			GB	None		
			USA	None		
	05-121	3M SCOTCH PTFE SELF ADHESIVE TAPE	F	None		N-Z6066
			D	None		
			GB	None		
			USA	None		
			C	5451 PTFE TAPE		
R	05-122	COHRLASTIC 9255 CW-9797 R/C-3594 SILICONE RUBBER SHEET	F	None	Silicone rubber sheet	US-71643
R			D	LN9108.5.5504		
R			GB	A-A-59588		
R				CL3B GR50		
R			USA	ZZ-R-765		
R				CL3B GR50		
			C	Z-13.302		
	05-129	8672 TAPE POLYURETHANE WITH ACRYLIC ADHESIVE	F	None	Radome temporary repair	F0347 FAPE3
			D	None		
			GB	None		
			USA	None		
	05-129A	8671 HS TAPE POLYURETHANE WITH ACRYLIC ADHESIVE	F	None	Radome temporary repair	FAPE3
			D	None		
			GB	None		
			USA	None		
	05-129B	5015 BC WHITE PATCH, POLYURETHANE WITH ACRYLIC ADHESIVE	F	None	Self-adhesive white patch for radome temporary repair	F7828
			D	None		
			GB	None		
			USA	None		
	05-129C	5015 GS GREY PATCH, POLYURETHANE WITH ACRYLIC ADHESIVE	F	None	Self-adhesive grey patch for radome temporary repair	F7828
			D	None		
			GB	None		
			USA	None		
	05-132	3M 8673	F	None	Use as an improved	76381

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	ANTI EROSION TAPE	D	None	alternative to CML 05-065	F0229 K5635
		AIB	AIMS 04-12-001		
		GB	None		
		USA	None		
05-135	DISA LABELS SUPRAFIX FRS A ACTIVATED DECAL	F	ASNB70830SP	To be used with CML 527B/15 activator according to manufacturer instructions	F8808
		D	None		
		GB	None		
		USA	BMS 3-38		
05-136	BSB LABEL DUROFIX TRANSFER ACTIVATED DECAL	F	ASNB70830SP	To be used with CML 05029 activator according to manufacturer instructions	F8808
		D	None		
		GB	None		
		USA	BMS 3-38		
05-137	527B/15 FIXATIVE FOR DECAL	F	ASNB70820SP	To be used with disa label durofix transfer according to manufacturer instructions	F0027
		D	None		
		GB	None		
		USA	None		
05-138	FLASHBREAKER 1R PRESSURE SENSITIVE TAPE	F	None	General flash tape	FAPE3
		D	None		
		GB	None		
		USA	None		

6. Lubricants

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
06-001	Information transferred to item No.06-001A				
OR					
06-001A	MOLYKOTE 3402C	F	None	Dry lubricant	N-D8367
		D	None		N-F7286
		GB	None		N-K7750
		USA	MIL-L-23398		US-94499
		C	Z-21.305		
OR					
06-001B	LUBRIBOND 220				US-85932
OR					
06-001C	MIL-L-23398 (OPEN)	F	None		LOCAL PURCHASE
		D	None		
		GB	None		
		USA	MIL-L-23398		
06-002	MOLYKOTE G	F	None	Fuel tank bolt lubricant (for structure steel or titanium) (obsolete use 06-011)	N-F3102
		D	None		N-F4281
		GB	None		N-K7750
		USA	MIL-L-8937		US-94499
06-003	Information transferred to item No.05-005				
06-004	SPS LUBE-7	F	None	Fuel tank bolt lubricant	N-U1811
		D	None		US-56878
		GB	None		
		USA	None		
OR					
06-004A	K7				N-K6405
					US-15653
OR					
06-004B	SPS LUBE-6 LUBRICANT	F	None	Fuel tank bolt lubricant	N-U1811
		D	None		US-56878
		GB	None		
		USA	None		
OR					
06-004C	AS 87132 TYPE I OR III CETHYL ALCOHOL LUBRICANT	F	None	Fuel tank bolt lubricant	Local purchase
		D	None		
		GB	None		
		USA	AS 87132 TYPE I OR III		
06-005	CETHYL ALCOHOL	F	None	Lubrication of fastener	Local purchase
		D	None		
		GB	None		
		USA	MIL-L-87132 Type I		
06-006	Anti-Seize	F	None	To prevent Locking of	Local

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	Compound	D	None	Screws Securing the IDG	purchase
		GB	None	Quick Attach/Detach	
		USA	DOD-L-25681	(QAD) Ring	
		C	Z-21.116		

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
06-007	GRAPHITE POWDER	F	AIR-4224	Lubrication	N-F5606
		D	None		
		GB	DEF-STAN 96-1		
		USA	SS-G-659		
06-008	MOLYKOTE G RAPID PLUS PASTE	F	TN 10006	Solid lubricant with a very low friction constant used as an assembly lubricant	*0440 N-F3102 N-K7750 US-94499
		D	None		
		GB	None		
		USA	None		
06-009	OS-124 OR OS-138, MCS-210	F	None	Generally used as assembly aids during APU build up	US-76541
		D	None		
		GB	None		
R		USA	37VA4		
OR					
06-009A	SANTOVAC 5				US-88559
06-010	DELAPENA No. 6	F	None	To hone internal dia. of bushes	DELAPENA CHELTE- NHAM ENGLAND
		D	None		
		GB	None		
		USA	None		
OR					
06-010A	DELAPENA EXTRA HONING FLUID	F	None		DELAPENA CHELTE- NHAM ENGLAND
		D	None		
		GB	None		
		USA	None		
OR					
06-010B	MAN-852 HONING FLUID	F	None		58436
		D	None		
		GB	None		
		USA	None		
06-011	Information transferred to item No.06-001				
06-012	DC-200	F	None	Lubricant	US-71984
		D	None		
		GB	None		
		USA	None		
06-013	LIQUI-MOLY Grade NV	F	None		US-98113
		D	None		
		GB	None		
		USA	None		
06-014	MOLYKOTE G RAPID PLUS SPRAY	F	None	Dry film lubricant	N-F3102 N-K7750 US-94499
		D	None		
		GB	None		
		USA	None		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
06-015	BRAYCOTE 601EF	F	None		98308
		D	None		ETF19
		GB	None		FAPE3
		USA	None		
06-016	MOLYKOTE Z MOLYBDDENUM DISULFIDE POWDER	F	AIR-4223		F3102
		E	Z-21.306		F4101
		GB	DEF-STAN 68-2		US-94499
		USA	AMS-M-7866		
		NAT	S-740		
06-017	GLYCEROL OR GLYCERIN	F	None	Lubrication of o-rings in potable water system	FAPE3
		D	None		
		GB	None		
		USA	None		

7. Lacquers

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	07-001	ASTRAL	F	None	Electrical bonding	N-F0351
		7-E-747	D	None	lacquer	
		+Hard-7-E-749	GB	None		
		+Thin-7-E-750	USA	None		
	OR					
	07-001A	Item not used				
	OR					
R	07-001B	NYCOTE 7-11	F	ASNB70720	Electrical bonding	US-05803
R			D	DA-2-668-19	lacquer	
R			GB	TH-5-943/1		
			USA	None		
	OR					
	07-001C	7D1586	F	None	No longer available	N-F0351
			D	None		N-H0951
			GB	None		
			USA	None		
	OR					
R	07-001D	4125/6407BLUE	F	None	Electrical bonding	US-33564
R			D	75-T-2-5721-3-1	lacquer	N-F1419
			GB	None		
			USA	None		
	07-001E	Item not used				
	07-001F	CV117	F	None	Fuel resistant	N-K5635
			D	None	lacquer	
			GB	None		
			USA	None		
R	07-001G	F69 BLUE BASE	F	FA3F2	Electrical bond	
R		+ HARDENER	D	D5608	varnish	
R						
	07-002	TITANINE	F	None	Anti-fretting primer	N-K5635
		LR 8123	D	None		
		+THIN TH94	GB	DTD-900/4650		
			USA	None		
R	07-003	7-X-74 FC	F	None	No longer available	US-98795
R		+HARD 10-C-81	D	None	replaced 07-003 with	
R		+THIN 66-C-28	GB	SL-1042	suffix	
		or 66-C-20	USA	LAC-C37-1301		
	OR					
	07-003A	Information deleted				
	OR					
	07-003B	Information deleted				
	OR					
	07-003C	AERODUR ARC	F	None	Abrasion resistant	N-H0951
		+ Hard-S-66/8	GB	None	lacquer	

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	+ Thin-C-25/90	USA	None		
		C	Z-12.515		
OR					
07-003D	F407-616	F	None		N-K6413
		GB	BAEP 3536		
		USA	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	07-003E	CELOGLISS Lab.1362				N-F1419
	OR					
	07-003F	24-T3 SERIES	F	None	Abrasion resistant	US-98795
		+ACTI.PC-216	D	None	polyurethane coating	
		+THIN TR-55	GB	None		
			USA	BMS 10-86		
				Type II Grade D		
	OR					
	07-003G	23-T3 Series + ACTI.PC-216 + THIN TR-55	F	None	Fluoropolymer-filled,	US-98795
			D	None	abrasion-resistant	
			GB	None	polyurethane coating	
			USA	BMS 10-86		
				Type I GRADE D		
R	07-004	Information transferred to item No. 07-004A				
	OR					
R	07-004A	G-12-E-25	USA	BMS 10-100	Wing coating	N-H0951
						US-0S4B8
	07-005	N-59111/MB37601	F	None	Anti-static lacquer	N-D8357
		+Hard-N-39/1327	D	None	(low resistivity)	
		+Thin-N-39/3460	GB	None		
			USA	None	General use : except	
	OR		C	Z-12.506	radome, antenna	
	07-005A	PYROFLEX 7-D-713			fairings	N-F0351
						N-H0951
		+Hard-0651				US-0S4B8
		+Thin-0651				

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
07-006	N-59502	AIB	TN 10106	Radome and antenna	N-D8357
	+Hard-N-39/1327		Type II	fairing	
	+Thin-N-39/3460	F	None		
		D	None		
		GB	None		
		USA	None		
OR					
07-006A	CELOMER 5014	F	None	Radome and antenna	N-F1419
	TYPE II	D	None	fairing	N-K2232
		GB	None		
		USA	None		
		AIB	TN 10106		
			Type II		
OR					
07-006B	ALEXIT 472-41	F	None	Radome and antenna	N-D2603
	+ HARD-400 +	D	None	fairings	
	THIN 901-45	GB	None		
		USA	None		
		AIB	TN 10106		
			Type II		
07-007	AERODUR NON	F	None	Non slip lacquer	N-F0351
	SLIP	D	None		N-H0951
	+Hard.S-66/22R	GB	None		US-0S4B8
	+Thin.C-25/90S	USA	None		
		C	Z-12.512		
OR					
07-007A	EC-1375	F	None		N-F0347
		D	None		N-K8767
		GB	None		US-26066
		USA	None		
OR					
07-007B	N-53639	D	DA4-653-86		N-D8357
	or				
	N-53621				
OR					
07-007C	LN-9368	F	None		N-D8357
	+Hard-KN-5217	D	None		

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
07-008	Information transferred to item No.16-046				
07-009	FL-7XXX +Thin-FL-7163 (The Ref. of the base depends on the color)	F D GB USA	None DA-4-653-90 None None	Mic top coating of furnishing components. For polycarbonat veneer	N-D6309
07-010 OR 07-010A	FL-7XXX +Hard.FL-4206 +Thin.FL-7162 (The Ref. of the base depends on the color) N-53651	F D GB USA	None DA-4-653-91 None None	Mic top coating of furnishing components. For common veneer. (obsolete use 16-047)	LOCAL PURCHASE

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	07-011	FL-7XXX +Thin-FL-1902 (The Ref. of the base depends on the color)	F D GB USA	None DA-4-653-94 None None	Mic top coating of furnishing components. ABS and PVC veneer. (obsolete use 16-003)	N-D6309
	07-012	Information transferred to item No.16-047				
	07-013	Item not used				
	07-014	700-153-003 +Thin- 665-550-025 ZINC CHROMATE PRIMER	F D GB USA	None None None None	Re-treatment after removal of corrosion	N-K7085
	07-015	690-152-004 +Thin- 665-550-025 STOVE ENAMEL	F D GB USA	None None None None	Re-treatment after removal of corrosion	N-K7085
R R	07-016	ORGOL 8600 PROTECTING LACQUER	F D GB USA	None D2607 None None	No longer available	N-D2607
R R R R R R R R R R	07-016A	MIL-I-46058 TYPE AR PROTECTING LACQUER OR MIL-I-46058 TYPE UR OR MIL-I-46058 TYPE XY	F D GB USA	None None None None	Permanent thred locking compound	

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	07-017	SIKKENS C21/100	F	None	Lacquer transparent (for landing gear label)	N-F0351
			D	None		US-0S4B8
			GB	None		
			USA	None		
	07-018	AERODUR CLEARCOAT U.V.R	F	None	Varnish	N-F0351
			D	None		US-0S4B8
			GB	None		
			USA	BMS 10-72 Type V		
			C	Z-12.412		
	OR					
	07-018A	DESOTHN HS CLEAR CA8001 B0900C	F	None	UV resistant varnish	N-F1419
			D	None		US-83574
			GB	None		K5635
			USA	None		
			AIB	AIMS 04-04-023		
R	OR					
R	07-018C	KOROFLEX PRIMER 823X439 + THINNER MEK	F	None	Paint primor	US-8357K
R			D	None		K5635
R			GB	None		Z0853
R			USA	TT-P-2760 TYPE I Class I		
	07-019	KOROFLEX PRIMER 823X439 + Thin MEK	F	None	Paint primer	*0370
			D	None		N-K5635
			GB	None		US-83574
			USA	TT-P-2760 Type I Class I		
	07-020	SECURING LACQUER identification paint	F	None	Identification of torque-lightened screwed connections	N-C1614
			D	DA 80-T-34-3006		
			GB	None		
			USA	None		
R	OR					
R	07-020A	ALEXIT 400 + ALEXIT 406-22 IDENTIFICATION PAINT	F	TNA 007-10012		N-D2603
R			D	None		
R			GB	None		
R			USA	None		
R	07-020C	EC-1252 IDENTIFICATION PAINT	F	None	Use for identification of movement tampering	US-26066
R			D	None		N-F0347
			GB	None		
			USA	BMS 8-45		
	07-021	SERMETEL W	F	None	Local repair of damaged sermetel coating	N-U7636
			D	None		
			GB	None		
			USA	None		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
07-022	INFORMATION		transfered to	item No. 13-004	
07-023	NYCOTE 88 (BASE AND HARDENER)	F	None	Transparent protective coating	US-05803
		D	DAN 1172-01		
		GB	None		
		USA	None		

8. Bonding and Adhesive Compounds

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R	08-001	ARALDITE AW-106	F	None	General purpose	N-F4364
R		+HV 953 U	D	DAN 1284-01	adhesive and insert	N-S3798
R			GB	ABR 2-0179	potting	US-02684
			USA	MMM-A-134 TypeI		
			C	Z-15.209		
	OR					
	08-001A	EC-1838 B/A	C	Z-15.229		N-D2607
						US-26066
	OR					
	08-001B	REDUX 408	F	None	Only honeycomb filler	N-S3798
			D	None	and laminating or for	
			GB	None	insert	
			USA	None	(obsolete use 08-086)	
	OR					
	08-001C	ARALDITE LY-560	F	None	Nonmetallic	N-F4364
		+HY 560	D	None	honeycomb repairs	N-4D163
		New Ref :	GB	None		
		ARALDITE	USA	None		
		LY 564-1	C	Z-18.165		
		+HY 560				
	OR					
	08-001D	Information transferred to item No.08-001C				
	08-002	LOCTITE 270	F	None	Permanent thread	N-F6033
			D	None	locking compound	N-D2617
			GB	None		N-K6405
			USA	MIL-R-46082		US-05972
				Type I		
			C	Z-15.503		
	OR					
	08-002A	LOCTITE 273	F	None		
			D	None		
			GB	None		
			USA	None		
	OR					
	08-002B	LOCTITE 271	F	None		
			D	None		
			GB	None		
			USA	ASTM-D-5363		
				GP02 CL2 GRD1		
			USA	MIL-S-46163-A		
				TYPE 1		
	08-003	LOCTITE 290	F	None	Thread locking compound	N-F6033
			D	None		N-D2617
			GB	None		N-K6405
			USA	MIL-S-22473		US-05972
				Grade A		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
			MIL-R-46082		
		C	Z-15.504		
08-004	RHODORSIL CAF 4	F	None	Silicone elastomer	N-F0107
	+Primer MB	D	None	cement	US-94499
		GB	None		
		USA	None		
		C	Z-16.312		
OR					
08-004A	RTV-732	F	None	Sealant-lavatories and	N-F3102
	or RTV-731	D	None	galleys	N-K7750
	or RTV-738	GB	None		US-71984
	+Primer 1200	USA	MIL-A-46106		
	or 4040		Type I		
		C	Z-16-306		
		C	Z-15.904		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
R	08-005B	HT 606A	F	ABS5006		N-K5416
R		SEALING TAPE				
R	OR					
R	08-005C	Information transferred to item No. 08-005B				
R	OR					
	08-005D	BF-1005(A)	F	ABS5006	Adhesive tape	096L9
		WHITE				
R	08-006	EC-1236	F	None	No longer available	N-F0347
R			D	None	Use 08-006 with suffix	N-K8767
			GB	None		US-26066
			USA	None		
R	OR					
R	08-006A	EC-847	F	None	Buna contact adhesive	
R		OR	D	None		
R		SCOTCH-WELD	GB	MMM-A-1617		
R		847	USA	None		
			C	Z-15.104		
	OR					
R	08-006B	SCOTCH-WELD	F	None		
		1099	D	None		
			GB	None		
			USA	MMA-189		
				CLASS 2		
R	OR					
R	08-006C	BOSTIK 1787	F	None	Product no longer	N-F2857
R			D	None	available replaced by	N-D9518
R			GB	S26-4013	08-006 Buna contact	N-U2215
R			USA	None	adhesive	
	OR					
	08-006D	EVO-STIK 5007/3				N-K2147
	08-007	LOCTITE 241	F	None	Thread locking compound	N-F6033
			D	None	(occasional removal)	N-D2617
			GB	None		N-K6405
			USA	MIL-R-46082		US-05972
				Type II		
	OR					
	08-007A	LOCTITE 274				
	OR					
	08-007B	LOCTITE 242	C	Z-15.502		
			USA	MIL-R-46082		
				Type II		
	OR					
	08-007C	SEALANT, HIGH				*1108
		TEMPERATURE				N-F5538
						N-F6899

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	08-008	FINALIN 943	F	None	Plastic filler	N-D2603
		+Hard. 5	D	DA 4-653-83		
			GB	None		
			USA	None		
	OR					
	08-008A	N-59300				N-D8357
		+Hard-N-59567				
		+Thin-N-39400				
	OR					
	08-008B	METALIX NPS	F	None		N-C1438
			D	TV53-3533/77		
			GB	None		
			USA	None		
R	08-009	PRIMER	F	None	No longer available	N-F6033
R		ACTIVATOR FOR	D	None	replaced by	N-D2617
R		ANAEROBIC	GB	None	CML 08-009C	N-K6405
		LOCQUIC T	USA	MIL-R-46082		US-05972
			C	Z-15.920		
R	OR					
R	08-009A	LOCTITE 7649	F	None	No longer available	
R			D	D2617	replaced by	
R			GB	None	CML 08-009D	
R			USA	None		
R			C	None		
	08-010	ARALDITE AV	F	None	Adhesive for PTFE-cloth	N-F4364
		138M + HV998	D	DA-4-653-3 E4		N-D3123
			GB	None		US-02684
			USA	None		
			C	Z-15.205		
	OR					
	08-010A	ARALDITE AW 134	F	None		N-F4364
		HV994 OR 997	D	DAN 1199-01		N-S3798
			GB	None		N-D3123
			USA	None		US-02684
			C	None		
	OR					
	08-010B	REDUX 408 B/A	F	None	Adhesive for PTFE.	
			D	None	Cloth	
			GB	None	(obsolete use 08-086)	
			USA	None		
	OR					
	08-010C	Information transferred to item No. 08-051				
	OR					
	08-010D	HYSOL EA9321	F	ASN-B-73411	Bonding CFRP/CFRP	N-S3837
			C	Z-15.240		US-04347

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
08-011	SUPERFLEXIT S-707 (+ HARD.R)	F	CM 164	Fuel tank vapor seal repair	N-F0582
		D	None		
		GB	None		
		USA	None		
OR					
08-011A	SCOTCH-WELD 1099	F	None		N-F0347
		D	None		N-K8767
		GB	None		US-26066
		USA	MMM-A-189 Class 2		
08-012	GRANGER 610/1016	F	None	Bonding of static discharger bases (Elec. conductive adhesive)	N-K4154
		D	TV55/3510/73		US-55635
		GB	None		
		USA	None		
		C	Z-15.701		
OR					
08-012A	E SOLDER 3021	F	None		N-C2055
		D	DA-4-653-3-E7		
		GB	None		
		USA	None		
08-013	LOCTITE 221	F	None	Thread locking compound	N-F6033
		D	None		N-D2617
		GB	None		N-K6405
		USA	MIL-R-46082 Type I		US-05972
OR			MIL-S-22473		
08-013A	LOCTITE 259				
OR					
08-013B	LOCTITE 222	C	Z-15.501		
08-014	REDUX 322 +Primer 122	F	None	Metal/Metal-Honeycomb/ Metal bonding	N-K5066
		D	None		US-02684
		GB	None		
		USA	None		
OR					
08-014A	ECCOBOND 104				N-K7512
					US-04552
OR					
08-014B	AF-143				N-F0347
					N-D2607
					N-K8767
					US-26066
08-015	Information transferred to item No.08-008				

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	08-016	Information transferred to item No.05-015				
	08-017	HYSOL EA-9309	F	None	For bonding metal to	US-04347
			D	None	metal	
			GB	S27-8006		
			USA	None		
			C	Z-15.242		
	OR					
R	08-017A	EC-2216-B/A	F	None	Adhesive structure	N-F0347
R		GRAY OR 3M	D	None	flexible	US-26066
R		SCOTCH WELD	GB	None		
R		2216 B/A GRAY	USA	DOD-A-82720		
			C	Z-15.201		
	OR					
R	08-017B	EC-3533-B/A	F	None	For bonding metal to	
R			D	None	metal	
			GB	None		
			USA	None		
	OR					
	08-017C	HYSOL EA 9330/1	F	None		US-04347
			D	None		
			GB	None		
			USA	None		
	OR					
	08-017D	DP 110	F	ASNB73504		N-D2607
R		Bonding	F	ASNA4036		N-F0347
		metal/metal	D	ASNA4036		N-K8767
			GB	None		US-26066
			USA	None		
			C	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
R	08-018	SCOTCH-WELD	F	TN.A.007.10010.	Bonding of viewing	N-F0347
R		1300L		021.00	window in FWD cargo	N-D2607
R				TN.A.007.10054.	compt lining	N-K8767
R				031.00		US-26066
R			D	DA4-653-3N1		
			GB	None		
			USA	MMM-A-121		
			C	Z-15.101		
	OR					
R	08-018A	Information transferred to item No. 08-018				
	OR					
R	08-018B	BOSTIK 2402	GB	DTD-900/4679	Bonding of viewing	N-F2857
R					window in FWD cargo	N-D9518
R					compt lining	N-U2215
	08-019	Information transferred to item No. 08-108				
	08-020	Information transferred to item No. 08-019				
	08-021	Information transferred to item No. 09-028				
	08-022	EC-3524-B/A	F	ASN-B-81251	Compound, void filler,	N-F0347
			D	DA-4-653-81	low density.	N-D2607
			GB	S26-4024	Honeycomb filler	N-K8767
			USA	None		US-26066
			C	Z-18.144		
	OR					
	08-022A	Item not used				
	OR					
	08-022B	Item not used				
	OR					
	08-022C	REDUX 252	F	ASN-B-81251	Compound, void filler,	N-S3798
			D	None	low density.	US-02684
			GB	None	Honeycomb filler	
			USA	None		

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
08-023	EC-2214	F	None	Repair adhesive for hot	N-F0347
		D	None	zone	N-D2607
		GB	None		N-K8767
		USA	MMM-A-132		US-26066
			Type I		
08-024	LOCTITE 307	F	None	Line repair using	N-F6033
		D	None	HARRISON unions	N-D2617
		GB	None		US-05972
		USA	MIL-R-46082		
		C	Z-15.517		
08-025	SCOTCH-WELD	F	None	Bonding of poly-	N-F0347
	3532 B/A	D	DA-4-653-3P2	carbonate	N-D2607
		GB	None		N-K8767
		USA	None		US-26066
OR					
08-025A	Information transferred to item No.08-025				
OR					
08-025B	SCOTCH-WELD	F	None	Two component	US-04963
	3549 B/A	D	DA-4-653-3P2	polyurethane adhesives	
		GB	None		
		USA	None		
08-026	ELASTOSIL E 43	F	None	Silicone rubber bonding	N-D2650
	or SK 43 or	D	None	high temperature	US-0DF77
	SWS 951	GB	None	sealant	
		USA	None		
08-027	AS-100-B	F	None	Polyethylene and nylon	N-U2875
	Adhesive (no	D	None	bonding	
	longer availa-	GB	S26-4016		
	ble, use	USA	None		
	08-027A)				
OR					
08-027A	Adsol 120	GB	S26-4016	Bonding of nylon and	*0780
	Adhesive			polypropylene parts	
08-029	LOCTITE 675	F	NSA 502-02	Adhesive for non-	N-F6033
		D	80-T-34-9020	removable assembly	N-D2617
		GB	None		US-05972
		USA	MIL-R-46082		
			Type I		
OR					
08-029A	LOCTITE 601	F	None		
		D	80-T-34-9020		
		GB	None		
		USA	MIL-R-46082		
			Type I		
		C	Z-15.509		

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	OR					
	08-029B	ASTM-D-5363 GP04 CL1 GRD1	F	None		
			D	None		
			GB	None		
			USA	None		
R	08-030	EPIKOTE 816 +Hard-RTU	F	None	No longer available use CML 20-022 or 20-032	*0312 N-U1553
R			D	None		
R			GB	None		
			USA	None		
			NL	TH5.558/3		
R	OR					
	08-030A	BONDMASTER 114A + Hard EPIKURE RTU	F	None		N-Z1030 US-01666
			NL	TH5.558/3		
			GB	None		
			USA	None		
	OR					
R	08-030B	EPIKOTE 816 +ARALDITE HY 943	F	None		N-F4364
			D	None		N-Z1030
			GB	None		US-01666
			USA	None		US-02684
			NL	TH5.558/3		
	08-031	Information transferred to item No.08-010				

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
08-032	SCOTCH 69	F	None	Insulating adhesive	N-F0347
		D	None	tape	N-D2607
		GB	None		N-K8767
		USA	MIL-I-19166		US-26066
		C	Z-24.340		
OR					
08-032A	MIL-I-19166	F	None		LOCAL
		D	None		PURCHASE
		GB	None		
		USA	MIL-I-19166		
08-033	LOCTITE IS 415	F	None	Bonding of cap on MLG	N-F6033
	(ex : IS 150)	D	TH-5-932/1	door sequence valve	N-D2617
		GB	None	(incorporated in MLG	N-K6405
		USA	MIL-A-46050	uplock)	US-05972
			Type I CLASS 3		
OR					
08-033A	MIL-A-46050	F	None		LOCAL
	TYPE I CLASS 3	D	None		PURCHASE
		GB	None		
		USA	MIL-A-46050		
			Type I CLASS 3		
08-034	LOCTITE 672	F	None	Removable Assembly	N-F6033
		D	None		N-D2617
		GB	None		US-05972
		USA	MIL-R-46082		
OR					
08-034A	LOCTITE 641	F	None	Removable Assembly	N-D2617
		D	None		N-6033
		GB	None		US-05972
		USA	MIL-R-46082		
		C	Z-15.515		
08-035	839-51/1	F	None	Corrosion prevention	N-2D428
	+Hard. 948-36	D	None	of debonded areas	
		GB	None		
		USA	None		
08-036	N-58479/T508	F	None	Non-structural repair	N-D8357
	+Hard.N-59029	D	DAN-1090	of composite components	
		GB	None		
		USA	None		
OR					
08-036A	INTERPLAN 100	F	None	Spatula filler	
	SP FINE TYPE B	D	None		
		GB	None		
		USA	None		
		AIB	AIMS 04-30-001		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
R	08-037	L-43	F	None	No longer available	N-D3123
R		+Hardener H91	D	DA-4-653-31		
			GB	None		
			USA	None		
	08-038	TESABAND 4541	F	None	Adhesive Tape	*0200
			D	None	Multiple use	N-F2209
			GB	None		N-D2571
			USA	None		
	08-039	ARALDITE CY 205	F	None	Cargo compartment	N-F4364
		+HY 956	D	VFN 13812	floor repair	N-S3798
		OR ARALDITE F	GB	None		US-02684
		+HARD HY905	USA	None		
			C	Z-18.113		
	08-040	Item not used				
	08-041	SCOTCH 5453	F	None	PTFE tape	N-F0347
			D	None		N-D2607
			GB	None		N-K8767
			USA	None		US-26066
			C	Z-24.333		

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	08-042	AF 163-2K-06	F	None	Repair of honeycomb	N-F0347
			D	DA 4-653-5 +	parts	N-D2607
				DA 4-653-6		N-K8767
				(PRIMER)		US-26066
			GB	None		
			USA	None		
			C	Z-15.429		
	OR					
	08-042A	FM73-M-06	F	None	Structural Adhesive	*0400
			D	None	Bonding	*0403
			GB	None		*0405
			USA	None		
			C	Z-15.429		
	OR					
	08-042B	EA 9628 NW 06	F	None		N-K0400
			D	None		N-S3837
			GB	None		US-04347
						US-12405
						US-33564
			USA	None		
R	08-043	Information transferred to item No. 08-043A				
	OR					
	08-043A	C-15	F	None	Glue (viton	N-F2538
			D	None	dissolution)	
			GB	None		
			USA	None		
	08-044	Information transferred to item No.08-044A				
	OR					
	08-044A	NOVAFLEX HU01	F	TN 10054	Polyamide adhesive for nylon-rilsan bonding	*1415
	08-045	Information transferred to item No. 16.024				
	08-046	BR 624	F	ASN-B 73405	Bonding	*0400
			D	TH-5-912/5		*0403
						*0405
	OR					
	08-046A	EC-3500 B/A	F	None	Honeycomb filler	N-D2607
			D	4-653-8		N-F0347
			GB	None		US-26066
			USA	None		
			C	Z-18.142		
	OR					
	08-046B	EC-3439 HT	F	ASN-B-73405		
			D	N838		

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
			GB	None		
			USA	None		
R	08-047	BSL 212	F	ASN-B 73461	Transferred to	N-D8274
R			D	None	CML 20041	N-F2605
			GB	None		N-K5066
			USA	None		N-S3798
						US-02684
	OR					
R	08-047A	FM41	F	None	No longer available	N-D9594
R			D	DA 4-653-7	replaced by 08-047C	N-K0227
R			GB	None	FM410-1 transfer to	US-07542
R			USA	None	CML 20041B	
			C	Z-15.415		
	OR					
R	08-047B	AF 3024-05			Transfer to CML 20041A	N-F0347
						K-8767
R						US-6A670
	OR					
R	08-047C	FM410-1	AIB	10-02-001	Replaced by CML 2041B	US-07542
R						US-1KU10
	08-048	LOCTITE 932	D	DA-2-657-4	Applied to Backshells	N-D2617
			GB	DTD 5629	Electrical Connectors	N-F6033
						N-K0458
						US-05972
	OR					
	08-048A	LOCTITE 221	US	MIL-R-46082	Applied to Backshells	N-D2617
				TYPE 1	Electrical Connectors	N-F6033
			US	MIL-S-22473		N-K6405
						US-05972

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
08-049	LOCTITE 542	F	None	Installation of screw	N-D2617
		D	None		N-F6033
		GB	None		N-K6405
		USA	None		US-05972
		C	Z-15.506		
08-050	LOCTITE 638	D	80-T-34-9020	Bearing Installation	N-D2617
		USA	MIL-R-46082	(Bonding)	N-F6033
			Type III		N-K6405
		C	Z-15.511		US-05972
OR					
08-050A	LOCTITE 680				
08-051	HYSOL EA934 NA	F	None	Bonding of aluminium	N-K0400
		D	DA-4-653-3-E8	sheets	US-12405
		GB	None		US-33564
		USA	MMM-A-132		
			Type I		
		C	Z-15.237		
08-051A	Information transferred to item No.08-025B				
08-052	SCOTCH 425 OR	F	None	Temporary protective	N-D2607
	SCOTCH Y 427	D	DAN 328 AN or	cover	N-F0347
			DAN 328 AP		N-K8767
		GB	None		US-26066
		USA	MIL-T-23397 and		
			or MIL-T-80B		
		C	Z-24.351		
OR					
08-052A	PERMACEL P-11	AIB	ABS5604A	Temporary protective	N-F0226
	OR P-11L	AIB	ABS5604AL	cover	US-99742
		D	DAN 328 AP		
		D	DAN 328 AN		
		USA	L-T-80B		
		C	Z-24.351		
08-053	SCOTCH 361	F	None	Temporary repair of	N-F0347
		D	DAN 328-H	cargo panels	N-K8767
		GB	None		US-26066
		USA	None		
		C	Z-24.341		
OR					
08-053A	P-621	F	NSA5375H		N-C3590
		D	DAN 328H		US-99742
		GB	None		
		USA	MIL-T-4053		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	08-054	EC-3520 B/A	F	None	Adhesive	N-F0347
			D	None		N-K8767
			GB	None		US-04963
			USA	None		US-26066
	08-055	BR 127	F	NT-10109	Bonding primer for slat	*0400
			D	None	leading edges	*0403
			GB	BAEP 3544		*0405
			USA	None		
			C	Z-15.915		
	08-056	RTV-106	F	None	Adhesive Silicone	US-01139
			D	None		
			GB	None		
			USA	MIL-A-46106		
				Type I		
			C	Z-16.305		
R	08-057	NOVASIL 1217	F	None	No longer manufactured	*1120
			D	None		
			GB	None		
			USA	None		
R	OR					
R	08-057A	FLOORSIL 1217	D	DA4-653-3H8	Primer for sealing on	D0919
R					NTF covering	
R	OR					
R	08-057B	OTTO PRIMER	D	DA4-653-3H8	Primer for sealing on	*1120
R		1217			NTF covering	
	08-058	LOCTITE 326	F	None	Installation of	N-D2617
			D	None	Locking Plates	N-F6033
			GB	AFS 1740		N-K6405
			USA	None		US-05972

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	08-059	EPIKOTE 828	F	None	Fast resin for tempo-	*1380
		+ VERSAMID 125	D	None	rary repair of bulk	N-F5152
		OR EPON 828	GB	None	cargo compartment floor	US-54527
		+ VERSAMID 125	USA	None	panel-cold curing	
					adhesive	
	08-060	PERMACEL 621	F	None	Glasscloth adhesive	N-F0226
			D	DAN 328H	tape (thermal	US-80769
			GB	None	insulation)	US-99742
			USA	MIL-T-4053		
	OR					
	08-060A	SCOTCH 361	F	None	Thermal insulation	N-D2607
			D	DAN 328H		N-F0347
			GB	None		N-K8767
			USA	MIL-T-4053		US-26066
	08-061	PERMACEL P12	F	None	Aluminium - backed	N-F0226
			D	DAN 328 AS	cotton tape. (Thermal	US-99742
			GB	None	& sound insulation)	
			USA	MIL-T-4053		
	OR					
	08-061A	Information transferred to item No.08-052				
	OR					
	08-061B	Information transferred to item No.08-061				
	08-062	Information transferred to item No.08-112				
	08-063	121 - TAPE	F	None	For use on liquid &	N-C0064
			D	None	gaseous oxygen systems	US-07512
			GB	None		US-26066
			USA	MIL-T-27730		
				SIZE 2		
			C	Z-22.193		
	OR					
R	08-063A	421 - TAPE	F	ASNA3500		US-26066
			D	None		
			GB	None		
			USA	MIL-T-27730		
R				SIZE 3		
R			US	A-A-58092		
	OR					
	08-063B	MIL-T-27730				Local
		OPEN - TAPE				purchase
	08-064	3M SAFETY WALK	F	None	Anti slip coating	N-D2607
		310	D	00000000000000		N-F0347
				10002558178		N-S3510
			GB	None		
			USA	None		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
OR					
08-064A	MIL-W-5044 TYPE 1 OPEN	F	None	For repair of non slip surfacing	Local purchase
		D	None		
		GB	None		
		USA	MIL-W-5044 Type I		
08-065	SCOTCH MOUNT 4016	F	None	Securing decompression panel (width as required)	N-F0347 US-26066
		D	None		
		GB	None		
		USA	MIL-T-60394 Type I, Class I		
		C	Z-24.362		
OR					
08-065A	MIL-T-60394 TYPE I CLASS I OPEN	F	None		Local Purchase
		D	None		
		GB	None		
		USA	MIL-T-60394		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	08-066	ISOTAC Y9473	F	None	Application to rubbing strip to fit on flap component Acrylic pressure sensitive adhesive film	D2607
			D	DAN319, DAN1202		
			GB	None		
			USA	None		
	08-067	EPIBOND 1559 A/B	F	None	Fast adhesive for quick repair	N-K5066 US-99384
			D	None		
			GB	None		
			USA	None		
	08-068	Scotch weld DP 100 Adhesive for gap filling	F	None	Used as a filling agent when doing a repair by replacement of a rudder attachment fitting	N-D2607 US-76381
			D	None		
			GB	None		
			USA	None		
	08-069	Scotch brand No. 5430	F	None	Temporary surface protection against media	N-D2607
			D	None		
			GB	None		
			USA	None		
	08-070	Information transferred to item No.08-022				
	08-071	Information transferred to item No.20-030				
	08-072	CYCOM HTA 5131/759	F	None	120 deg.C cure prepreg for repairs to the L/E access panels and covers	N-B0539 N-D9594 N-R0227
			D	None		
			GB	None		
			USA	None		
R	08-073	ABS5662 open	F	ABS5662	Insulation blanket repair adhesive tape	N-F2538
R	OR					
R	08-73A	KB42	F	ABS5662A	Renforcement of insulating bags made of covering material TERUL 18, TERUL 19	N-F2538
	08-074	Masking Tape	F	None	Masking off repair	LOCAL
	08-074	Masking Tape	F	None	Masking off repair area	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	None		
	08-075	AKRO fireguard 300-P	F	None	Quick repair of cargo compartment liners	* 0123
			D	WA-10016		
			GB	None		
			USA	None		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
08-076	AKRO fireguard 302-P	F	None	Quick repair of cargo compartment liners	* 0123
		D	WA-10016		
		GB	None		
		USA	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	08-077	AKRO fireguard 306-P	F	None	Quick repair of cargo compartment liners	*0123
			D	WA-10016		
			GB	None		
			USA	None		
	08-078	HYSOL EA9394 part A and B	F	None	Bonding of structure semi-shell parts shimming/filling	*0880 N-S3837 US-33564
			D	DAN 1196		
			GB	None		
			USA	None		
	08-079	ORCOTAPE OT-40	F	None	Installation of adhesive tape for carpets.	*0765 *1105
			D	DAN 382		
			D	DAN 1297-01		
			GB	None		
			USA	None		
	08-082	SCOTCH 950	F	None	Adhesive tape for NTF	N-D2607 N-F0347 US-26066
			D	DAN 319		
			D	DAN 1211-01		
			GB	None		
			USA	None		
	08-083	TEDLAR, PF-Glass Laminate, Rapid Hot-Melt patch	F	None	Temporary repair of cargo panels	SE992
			D	None		
			GB	None		
			USA	None		
			C	None		
R	08-085	DAN 269A25 Open adhesive tape, PTFE	F	None	No longer available	LOCAL PURCHASE
			D	DAN 269A25		
			GB	None		
			USA	None		
R	OR					
R	08-085A	SPSA-205	F	None	Adhesive tape for PTFE	F9492
R			D	DAN 269A25		

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
08-086	Redux 403 EPOXY RESIN + HARD, adhesive	F	None	Non structural bonding	K-1007
		D	None		
		GB	None		
		USA	MMM-A13T Type I CLASS 3		
08-087	BOSTICK AXIOM SA 100	F	None	Required for assembly of thermoplastic static discharger retainers to metallic composite	N-F2605
		D	None		
		GB	AFS 2318		
		USA	None		
08-088	FM73-M-03	F	None	Film surfacer sandwich repairs	US-0W682
		D	None		
		GB	None		
		USA	None		
		C	Z-15.441		
08-089	REDUX 420	F	None	HTP spar box skin repair	US-0W682
		D	None		
		GB	None		
		USA	None		
		C	Z-15.213.1		
		AIB	TN-10054		
08-090	Information transferred to item No.20-032				
08-091	DOUBLE BOND	F	None	Filling existing countersinks covered by external patches	N-K0356
		D	None		
		GB	DTD-900/6105		
		USA	None		
08-092	S-1125 (RK6619)	F	None	Fire plug sealing	N-F6220 N-K1010
		D	None		
		GB	None		
		USA	None		
		C	Z-15.243		
08-093	PSA529 + SRC18	F	None	Used for repair of the karman fairing. For non-silicone surfaces primer SS-4004 is required	N-K1476 US-0D426
		D	None		
		GB	None		
		USA	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	08-094	BOSTIK 2230 Part 1 and Part 2	F D GB USA	None None None None	Used to adhesively bond repair patches to bestobell muffs and insulation sleeves with FKM coating	N-D2090 N-U2215
	08-095	RTV-159	F D GB USA	None None None None	Repair of blankets on the APU	N-D8527 US-38731
R	08-096	SS4004	F D GB USA	None None None None	No longer manufactured	N-D8527 OD426
	OR					
	08-096A	SS4044	F D GB USA	None None None O1139	Primer for silicone sealant RTV-159	
R	OR					
R	08-096D	SS4004P	F D GB USA	None CB823 None O1139	Primer for silicone	
	08-097	5481	USA	MIL-I-23594 TYPE I, CLASS 5		D2607
	OR					
	08-097A	SCOTCH 61	USA	MIL-I-23594 TYPE I, CLASS 5		
	OR					
	08-097B	P-421	USA	MIL-I-23549 TYPE I, CLASS 5		C3590
	OR					
	08-097C	TEMP-R-TAPE TV	USA	MIL-I-23549 TYPE I, CLASS 5		*0630
	OR					
	08-097D	MYSTK 7505	USA	MIL-I-23549 TYPE I, CLASS 5		C0548
	08-098	Information transferred to item No.20-028				
	08-101	RT 602 A/B			Silicon compound, 2 part addition curing	
R	08-103	REPAIR COMPOUND ADHESIVE A OR REPAIR COMPOUND			Repair kit for washbasin	N-F1900

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
		HARDENER B				
R	08-104	KB 29	AIB	ABS5093B485	No longer available	F-2538
R						US-09XN1
R						C-QB284
R	OR					
R	08-104A	KB 49	F	ABS5093B	Liquid barrier foil	F-2538
R			F	ABS5725A	(PSA)	
R	OR					
R	08-104B	8663DL	AIB	ABS5725ML		US-76831
R						
R						
	08-106	PASA-JELL 105			Surface preparation material	US-83574 N-K5635
	08-108	3M 7924 SILVER			Foil, polyester, pressure sensitive	07WQ0
	08-112	PERMACEL P 55	D	DAN 328	Tape for carpet installation	US-99742 N-C3590
	08-113	PERMAGLASS 400	AIB	AIMS 08-07-002	Core filler for the repair of cargo compartment linings	N-K1789
	OR					
	08-113A	GILLPATCH 1367P	AIB	AIMS 08-07-002		N-1KN26
	08-114	SPEEDPATCH AF 800 SERIES	AIB	AIMS 08-07-001	Core filler for the repair of cargo compartment linings	N-ORHU7
	OR					
	08-114A	GILLPATCH III	AIB	AIMS 08-07-001		N-1KN26
	08-115	CORE FILLER AMBIENT TEMPERATURE CURING EPOCAST 1633 A/B	AIB	AIMS 08-08-001	Core filler for the repair of cargo compartment linings	ST205 99384
	OR					
	08-115A	CORE FILLER AMBIENT TEMPERATURE				F0347

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
		CURING 3524 A/B FST				
	OR					
	08-115B	CORE FILLER AMBIENT TEMPERATURE CURING AF444 SPEED FILL				ORHU7
	OR					
	08-115C	CORE FILLER AMBIENT TEMPERATURE CURING ALEXIT 495 14 ALEXIT 49114	D	DAN 1282		D2603
	08-116A	EPOLAM 2500/ 2501	AIB	AIMS 04-27-002	Mainly qualified for repairs of air conditioning and cooling ducts	
	08-117	SAFETY WALK BLACK REF 610	AIB	ABS5092A	Anti slip for floor and roller mats	N-D2607 N-F0347 N-K8767 US-26066
	08-118	RELINK 2318; VERSION B	F	ABS5648B	Unprotected side of tape facing the floor panel	
R R R	08-122	TERUL 18	AIB	ABS5429A004A	Covering film for thermal acoustic insulation	N-F2538
R R R R R	08-123	RL6000SA	AIB	ASNA5107	Support and mechanical protection of electrical wiring in wiring support	FAPE3
R R R	08-124	8663	AIB AIB	ABS5725M AIMS 10-05-003	Liquid barrier foil (PSA)	US-76831

9. Sealants

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R	09-001	PR-1422-A	F	None	No longer available	*0370
R			D	None	Replaced by 09-001	*0372
R			GB	DTD-900/4590	with suffix	N-F0229
			USA	MIL-S-8802		N-K0113
				Type I, Class A		US-83574
R	OR					
R	09-001A	PS-890/A	F	None	Repair sealant for	*0370
R			D	None	fuel leak	*0372
			GB	None		N-S3837
			USA	MIL-S-8802F		US-22360
				Type II Class A		
			C	Z-16.134		
	OR					
	09-001B	PR-1422-A-NA	F	ASNA4163		*0370
			D	None		*0372
			GB	None		N-F0229
			USA	MIL-S-8802		N-K0113
				Type I, Class A		US-83574
	OR					
	09-001C	PR-1440-A	F	None	Fuel tank and	*0370
		Sealant,	D	None	pressurized	*0372
		Polysulfide	GB	None	cabin sealant	N-F0229
			USA	MIL-S-8802		N-K0113
				Class A		US-83574
			C	Z-16.134		
	09-002	Information transferred to item No.09-002B				
	OR					
	09-002A	PS-890/B	C	Z-16.135	Fuel tank and pressu-	N-S3837
			USA	MIL-S-8802	rized cabin sealant	US-22360
				Type II Class B	Sealant, polysulfide,	
					fillet consistency	
	OR					
	09-002B	PR-1422-B-NA	F	None		*0370
			D	None		*0372
			GB	None		N-F0229
			USA	None		N-K0113
						US-83574
	OR					
	09-002C	PR-1440-B	F	None	Sealant of fuel tanks	*0370
			D	None	and pressure cabin	*0372
			GB	None		N-F0229
			USA	MIL-S-8802		N-K0113
				Class B		US-83574
			C	Z-16.135		
	OR					
	09-002D	PR-1776-B	AIB	AIMS 04-05-012	Sealant permapol P5	*0370
			USA	AMS 3281	for fuel tank	*0375

ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
				N-F0229
				US-83574

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	09-003	PR-1321-A	USA	None	Access door sealant	
			C	Z-16.115	(obsolete use 09-018)	
	09-004	Information transferred to item No.09-016				
R	09-005	PR-1431-G	F	ASNA4172	No longer available	*0370
R			D	None	In QPL product	*0372
R			GB	None	replaced by 09-005	N-F0229
R				None	with suffix	N-K0113
R			USA	MIL-PRF-81733		US-83574
			C	Z-16.101		
	OR					
R	09-005E	PS-870-C	F	None	Interfay polysulfide	
R			D	None	sealant	
R			GB	None		
				None		
			USA	MIL-S-81733		
			C	Z-16.101		
	OR					
R	09-005F	Information transferred to item No.09-005				
R	OR					
R	09-005G	MC780C	AIB	AIMS 04-05-001		N-D1940
R			AIB	AIMS 04-05-012		
	09-006	Information transferred to item No.09-002				

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	09-007	PR-1005-L	F	None	Sealant	*0370
			D	None		*0372
			GB	DTD-900/4493		N-F0229
			USA	MIL-S-4383		N-K0113
			C	Z-16.201		US-83574
	OR					
	09-007A	EC-776 OR SCOTCH-WELD 776	F	None	Bonding acrylonitrile rubbers in a fuel soaked environment	N-D2607
			D	None		N-F0347
			GB	None		N-K8767
			USA	MIL-S-4383		US-26066
R	09-008	PR-5401-K	F	None	No longer available	*0370
R			D	None		*0372
			GB	None		N-F0229
			USA	MIL-S-8802 Class A		N-K0113 US-83574
	OR					
	09-008A	PR-1221-A	F	None		
			D	None		
			GB	None		
			USA	MIL-S-7502 Class A		
	OR					
	09-008B	PS-707-BT	F	None		N-S3837
			D	None		US-22360
			GB	None		
			USA	None		
	OR					
	09-008C	OYLTITE	F	None	Top coat sealant in fuel tanks applied over PR-1422	08854
			D	None		
			GB	None		
			USA	None		
	OR					
R	09-008D	Information transferred to item No.09-058				
	OR					
R	09-008E	Information transferred to item No.09-058				
	OR					
R	09-008F	Information transferred to item No.09-058				
	OR					
R	09-008G	Information transferred to item No.09-058				

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
09-009	Information transferred to item No. 09-008C				
09-010	Information transferred to item No. 08-091				
09-011	PR-1720-SM	F	None	Bonding of center tank	*0370
	+primer 1732	D	None	access door seals	*0372
	+primer 1733	GB	None	Sealant, Viton base	N-F0229
		USA	None		N-K0113
					US-83574
09-012 OR 09-012A OR 09-012B OR 09-012C OR 09-012D	Information transferred to item No.09-012F				
09-012E	RTV-88 + CATALYST 9910	C	Z-16.301	Sealing compound high temperature use	*0660
					*0680
					*0700
					US-01139
09-012F	DAPCO 2100	AIB	AIMS 04-05-008	Application in high temperature areas on engine pylons	1XNT8
		F	AIMS 04-05-003 TYPE II		
		US	AMS 3374 TYPE 1		
		US	AMS 3374 TYPE 3		
		US	AMS 3374 TYPE I		
09-012G	PR-1910	F	ASNA 4180	Sealant utilisation	US-83574
	+ JFP 7010	F	ASNA 4181		N-F0229
		US	BMS-5-62 TYPE B		N-K5635
		US	BMS-5-68 TYPE K		N-Z0853

	ITEM	DESIGNATION	SPECIFICATIONS			USAGE	COD.SPLR
R	09-013	PR-1436-GA	F	None		Replaced by any 09-013	*0370
R			D	None		with suffix	*0372
			GB	None			N-F0229
			USA	MIL-PRF-81733			N-K0113
			C	Z-16.127			us-83574
R	OR						
R	09-013A	Information transferred to item No.09-013					
R	OR						
R	09-013B	PR-1436GA(NA)	F	ASNA4165		For areas subjected to	*0370
R			D	None		extensive corrosion	*0372
			GB	None			N-F0229
			USA	MIL-PRF-81733			N-K0113
	OR						
	09-013C	PR-1422A-NA	US	MIL-S-8802			US-83574
				TYPE I			N-F0229
			D	None			N-K5635
			GB	None			
	OR						
	09-013D	PR-1440A	US	MIL-S-8802			US-83574
				TYPE II CLS A			N-F0229
			D	None			N-K5635
			GB	None			
	OR						
	09-013E	PS-890-A	US	MIL-S-8802			US-83574
				TYPE II CLS A			N-F0229
			D	None			N-K5635
			GB	None			
			C	Z-16.134			
	OR						
	09-013F	PS 870 A	USA	MIL-PRF-81733		For axle sleeve,wheel	US-83574
				TYPE I CLS I		and brake	N-F0229
			D	None			N-K5635
			GB	None			
	OR						
	09-013G	MC 238A	AIB	AIMS 04-05-002			N-D1940
	09-014	Information transferred to item No.09-007					
	09-015	OBSOLETE TO BE REPLACED BY ITEM 09-019					
	OR						
	09-015A	OBSOLETE TO BE REPLACED BY ITEM 09-019					

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	09-016	PR-1436-GB-2	F	None	Fillet sealant along	*0370
		or	D	None	edges of wing skin	*0372
		PR-1436-GB-1/2	GB	ABGN/44/83324	stringers	N-F0229
			USA	MIL-PFR-81733D	Polysulfide sealant	N-K0113
				Type II	dichromate cured	US-83574
				Class B		
			C	Z-16.113		
	OR					
R	09-016A	Information transferred to item No. 09-016				
	OR					
R	09-016B	PR-1436GB-NA	F	ASNA4165	Fillet sealant along	*0370
R			D	None	edges of wing skin	*0372
R			GB	None	stringers	N-F0229
R			USA	MIL-PFR-81733D	Polysulfide sealant	N-K0113
R				Type II	dichromate cured	US-83574
	OR					
	09-016C	JFM 1675 GB	F	None		N-F0229
			D	WL-5.5962.1		
			GB	None		
			USA	MIL-PFR-81733D		
				Class B 1/2		
			C	None		
	OR					
	09-016F	P/S 870B	F	None		N-K5635
			US	MIL-PRF-81733		US-92108
			GB	None		
	OR					
	09-016H	MC 238B	AIB	AIMS 04-05-002		N-D1940
	OR					
R	09-016J	PR 2001B	AIB	AIMS 04-05-001	Product to be used	US-83574
R					with adhesion primer	N-K5635
R					PR-184	
R					Fillet sealant	
	09-017	PR-7422	F	None	Individual nut and bolt	*0370
			D	None	sealing	*0372
			GB	DTD-900/6137	Polysulfide sealant	N-F0229
			USA	None		N-K0113
						US-83574
	OR					
	09-17A	Information transferred to item No. 09-017				
	09-017B	PR-1422-A-NA	F	None		N-F0229
			D	None		N-K5635
			GB	None		US-83574
			USA	MIL-S-8802		
				Type I		
	09-018	PR-1403GA	F	None	No longer available	*0370

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
R		or	D	DAN 1269-03	Replaced by 09-018	*0372
R		PR-1403GA(NA)	GB	None	with suffix	N-F0229
			USA	AMS 3267/3		N-K0113
						US-83574
	OR					
	09-018A	Information transferred to item No. 09-018				
	OR					
	09-018C	PR-1428-A	USA	WAS MIL S 8784	Low adhesion	N-F0229
					polysulfide sealant	N-K5635
						US-83574
	OR					
	09-018D	MC-216 A-2	D	0000000000000	Low adhesion	N-D1940
				10002562616	sealant	

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	09-019	PR-1403-GB	F	None	No longer available	*0370
R		OR	D	80-T-34-9000	Replaced by 09-019	*0372
R		PR-1403-GB(NA)		DAN 1270-03	with suffix	N-F0229
R		OR	D	DA-2-657-2-EDB		N-K5635
			GB	None		US-83574
			USA	AMS 3267/3		
	OR					
	09-019A	Information transferred to item No. 09-019				
	OR					
	09-019D	MC-216 B-2	D	00000000000000	Low adhesion sealant	N-D1940
				10002562616		
	09-020	Information transferred to item No.05-002				
	09-021	Information transferred to item No.09-016				
	09-022	Information transferred to item No.09-046				
	09-023	PR-812	F	ASNA4187	Sealing duct to wing	*0370
			D	None	skin joint	*0372
			GB	None		N-F0229
			USA	MIL-S-38249		N-K0113
				Type I		US-83574
			C	Z-16.206		
	OR					
	09-023B	DAPCO 2200	F	None	Application in high	*04622
		TYPE 1	D	None	temperature areas	
			GB	None		
			USA	AMS 3374		
	09-024	PR-1301	F	None	Sealing attachment	*0370
			D	None	plates	*0372
			GB	DTD 900/4523	Low adhesive sealant	N-F0229
			USA	None	obsolete use 09-018 or	N-K0113
					09-019	US-83574
	09-025	PR-1436-G	F	ASNA4156	Protection of floor	*0370
		SPRAY	D	None	structure	*0372
			GB	None		N-F0229
			USA	MIL-S-81733		N-K0113
				Type III		US-83574
	09-026	RTV-730	F	None	Sealant, fluorosilicone	N-K7750
		+PRIMER DC-1200	D	None		US-71984
			GB	None		
			USA	None		
			C	Z-16.403		
	09-027	Information transferred to item No. 08-092				

ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R	09-028	PR147	F	None	No longer available	*0370
			D	None		*0372
			GB	TH-6-6548		N-F0229
			USA	None		N-K0113
						US-83574
	OR					
	09-028A	PR 148 AF	F	ASNA4170	Adhesion promoter for	*0370
			D	None	sealant which contains	*0372
			GB	None	no chlorinated and no	N-F0229
			USA	None	chromatic solvents	N-K0113
						US-83574
	OR					
	09-028B	PR 148	F	None	Sealing of	*0370
			D	None	aerostructure	*0375
			GB	None		N-F0229
			USA	None		N-K5635
						US-83574
	OR					
	09-028F	PR186	F	None	Use PR186 adhesion	N-K5635
			D	None	promoter on glass and	N-F0229
			GB	None	acrylic with	US-85570
			USA	None	09-045A sealant	
	09-029	Information transferred to item No. 09-008D				

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
09-030	TEROSTAT 81 (SEAL TAPE)	F	None	Vacuum bag sealant	N-D2147 N-F0339
		D	80-T-50-4005		
		GB	None		
		USA	None		
09-031	C-3516 (A+B)	F	None	Vapor seal	N-C0076
		D	None		
		GB	None		
		USA	None		
09-032	PR1196	F	None	Trim Tank Sealing	N-F0229
		D	None		
		GB	None		
		USA	BMS5-81		
09-033 OR 09-033A	Information transferred to item No.09-033A				
	GS213 TACKY	F	None	Vacuum Bag Sealant	N-FA2R7
		D	None		
		GB	None		
		USA	None		
09-034	Information transferred to item No. 09-012E				
09-035	Information transferred to item No.09-056				
09-036	FLOORSIL 87	F	None	N.T.F Jointing (Airfloor) (used with 08-057)	*1045 N-D0919
		D	None		
		GB	None		
		USA	None		
09-037	Information transferred to item No. 16-053				
09-038	Information transferred to item No. 09-028B				
09-039	Information transferred to item No. 09-008E				

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	09-042	PR 1431 TYPE T	F	None	Sealing of aero-	COURT-
			D	None	structure	DAULDS
			GB	DTD 900/4900	Polysulphide sealant	AUSTRA-
			USA	None	for interfay	LIA
						COURT-
						DAULDS
						HONG-
						KONG
						N-F0229
						N-K0113
						US-83574
R	09-043	PR 1431 TYPE I,	F	ASNA4171	No longer available	COURT-
R		Type II	D	None	Replaced by 09-043	DAULDS
R			GB	DTD 900/4611	with suffix	AUSTRA-
			USA	None		LIA
						COURT-
						DAULDS
						HONG-
						KONG
						N-F0229
						US-83574
R						N-K5635
R	OR					
R	09-043A	MC 238C12	AIB	AIMS 04-05-002	No longer available	D-1940
R					(Never produced)	
	OR					
	09-043C	PS 892-C	F	None	Interfay polysulfide	N-F0229
			D	DAN 1184	sealant	N-K5635
			AIB	AIMS 04-05-002		US-83574
			USA	None		
R	OR					
R	09-043D	MC 780C	AIB	AIMS 04-05-001		D-1940
R			AIB	AIMS 04-05-012		
R	OR					
R	09-043E	PR1782C	AIB	AIMS 04-05-012	Interfay sealant fuel	US-85570
R					tank	N-F0229
R						N-K5635
R						
	09-044	Information transferred to item No. 09-043				

ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
09-045	PR 1425 or PR 1425B(NA)	F None D None GB DTD 900/6021 USA None	"Weather Seal" repair	COURT-DAULDS AUSTRALIA COURT-DAULDS HONG-KONG N-F0229 N-K0113 US-83574
09-045A	PR 1784 B1/2	AIB AIMS 04-05-009	Sealant used on all substrates: glass, PMMA aluminium, stainless steel, titanium, except for polycarbonate	N-F0229 N-K5635
09-046	PR-1750-A Polysulphide fuel tank sealant	F None D None GB None USA MIL-S-83430 Class A USA AMS 3276 C Z-16117	Sealing of Joints in Fuel-contaminated areas	N-F0229 N-K5635 US-83574
09-047	PR-1750-B	F None D None GB None USA MIL-S-83430 Class A USA AMS 3276 C Z-16118	Sealing of joints in fuel-contaminated areas Polysulphide fuel tank sealant	N-F0229 N-K5635 US-83574
09-048	Information transferred to item No.09-043A			
09-049	Information transferred to item No. 09-008F			
09-050	PR-1432-GP	F None D None GB None USA BMS 5-95 Type I Class F1 C Z-12.118	Used for repair of the tedlar film installed on the inside surface of the trailing edge access door	N-F0229 N-K83574
09-051	PR-1765 (Base and accelerator)	F None D DAN 1273 GB None	Repair in area of collector plates and "static discharges"	N-F0229

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	conductive sealant	USA	None		
OR					
09-051A	PR-1764 conductive sealant	F	None		N-F0229
		D	None		
		GB	None		
		USA	AMS 3266		
09-052	SILASTIC 9161 RTV + Hard N 9162 + PRIMER DC1200	F	None	Pressure seal (compound filled) NOTE: APPLY DOWN CORNING 1200 PRIME COAT ON SURFACE SILASTIC 9161 IS TWO PART	*0440
		D	None		*0450
		GB	None		N-K6835
		USA	None		

	ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
	09-053	DAPCO 72, PRIMER DAPCO 1-200	F None D None GB None USA None	Fast-curing two part silicone DAPCO 72 for windscreens. Apply primer DAPCO 1-200 (one part) on surfaces as adhesion promoter	*0122 US-1XNT8
	09-054	FLOORSIL 2	F None D DA4-653-3 SF GB None USA None	To be used with primer 1217 (08-057), but not with airfloor (METZELER)	D0919
	09-055	PR 149 ADHESION PROMOTER	F None D DAN1218-05 GB None USA None		N-F0229 N-K5635 US-83574
R R	09-058	PS-860B + PRIMER PR 148	F None D None GB None USA AMS-S-83318	No longer available Transferred to 09-058D	N-F0229 N-K5635 US-83574
R	OR				
R R	09-058A	PR-1826-B +PRIMER PR 1826	F None D None GB None USA AMS 3277	Quick repair sealant fuel and outside fuel	*0370 *0375 N-F0229 N-K5635 US-83574
	OR				
	09-058B	PR-1828B + PRIMER PR 186	F None D None GB None USA AMS 3277		*0370 *0375 N-F0229 N-K5635 US-83574
	OR				
	09-058C	PR-2001 B + PR-184 OR PR-2001B + PR-187	AIB AIMS 04-05-002 D None GB None USA None		N-F0229 US-83574
R	OR				
R R R R R	09-058D	MC238B1/4	AIB AIMS 04-05-001 AIB AIMS 04-05-002 + MC110 Adhesion promoter		N-D1940
R	OR				
R R R	09-580	PR-1826-A	F None D None GB None USA MIL-S-83430	early Quick repair fuel tank sealant	N-F0229 *0370 *0375 US-83574

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R						N-K5635
R	09-060	MC-780B	AIB	AIMS 04-05-001	Extrusion gun or	N-D1940
R			AIB	AIMS 04-05-012	spatula applicable for	
R					fillet and overcoating	
R					NOTE : Contains	
R					holospheres, not to be	
R					used as interfay	
R					sealant	
R	09-061	MC-780A	AIB	AIMS 04-05-001	Fuel tank & general	US-85570
R			AIB	AIMS 04-05-012	purposes applicable	N-F0229
R					materials for	N-K5635
R					overcoating	
R					NOTE : Contains	
R					holospheres, not to be	
R					used as interfay	
R					sealant	
R	OR					
R	09-061A	PR1782A			Fuel tank & general	
R					purpose brush	
R					applicable for	
R					overcoating	
R					NOTE : Contains	
R					holospheres, not to be	
R					used as interfay	
R					sealant	
R	09-062	PR1782B	AIB	AIMS 04-05-001	Fuel tank & general	N-F0229
R			AIB	AIMS 04-05-012	purpose extrusion gun	N-K5635
R					or spatula applicable	US-85570
R					materials for fillets	
R					& overcoating	
R					NOTE : Contains	
R					holospheres, not to be	
R					used as interfay	
R					sealant	

10. Anti Icing and De-Icing Materials

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	10-001	FLUID DE-ICING AEA/ISO TYPE I AMS 1424	F D GB USA ISO	None None None AMS 1424 11075	De-icing Type I. (Short holdover time)	N-F2756 N-F1858 N-20638 Local Purchase
	OR					
	10-001A	Information transferred to item No. 10-001				
	10-002	Information transferred to item No. 11-010				
	10-003	ANTI/DE-ICING FLUID AEA/ISO TYPE II ISO 11078	REF D USA ISO	AMS 1428 OPEN AMS 1428 ISO 11078	Aircraft Anti/De-icing Fluid Type II (Longer holdover time)	LOCAL PURCHASE D2200 F2756 K0522
	OR					
	10-003A	Information transferred to item No. 10-003				
	OR					
	10-003B	Information transferred to item No. 10-003				
	OR					
	10-003C	Information transferred to item No. 10-003				
	10-004	ANTI ICE/DE ICING TYPE IV	REF	AMS 1428		LOCAL PURCHASE
R R R	10-005	ANTI ICE/DE ICING SAE TYPE III	USA	SAE AMS 1428	De icing/anti icing	LOCAL PURCHASE

11.Cleaning Agents

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	11-001	TEEPOL 610	F	None	Stain remover	N-F1858
			D	None		
			GB	None		
			USA	MIL-D-16791 Type I		
	OR					
	11-001A	TURCO AIR TEC	F	None		N-F3172
			D	None		N-D8908
			GB	None		
			USA	MIL-C-87936		
	OR					
	11-001B	Information transferred to item No. 11-001K				
	OR					
	11-001C	SYNCLAIR	F	None		N-F6892
			D	None		
			GB	None		
			USA	AMS 1527 AMS 1526		
	OR					
	11-001D	Item not used				
	OR					
	11-001E	Item not used				
	OR					
	11-001F	Item not used				
	OR					
	11-001G	NETAL A202	USA	AMS 1526	Exterior aircraft Cleaning Agent	N-F2756
	OR					
	11-001H	NETAL SL-8 OR SL-8M	USA USA	MIL-C-87936 AMS 1526		
	OR					
	11-001I	Information transferred to item No. 11-001G				
	OR					
	11-001J	Information transferred to item No. 11-001G				
	OR					
R	11-001K	Information transferred to item No. 11-001Q				
	OR					
R	11-001L	ARDROX LEEDER	USA	AMS 1526	Exterior aircraft	N-C1308
R		140-B			cleaning agent	N-F1705
	OR					
R	11-001M	Information transferred to item No. 11-001Q				
	OR					
	11-001N	Information transferred to item No. 11-001G				
	OR					
	11-001P	MAGNUS 149X	USA	AMS 1526	Exterior aircraft	N-F3568
		AERO	USA	MIL-C-87936	cleaning agent	N-H3259
						N-K0618
	OR					

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
11-001Q	AMS 1526, 1527	F	None		LOCAL PURCHASE
		D	None		
		GB	None		
		USA	MIL-C-87936		
			MIL-C-43616		
		USA	AMS 1526		
			AMS 1527		

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
11-002	PD-680 OPEN	USA	PD-680 Type I OR TYPE II	Cleaning of mechanical parts	LOCAL PURCHASE
		GB	BS 245 : 76 Type I		
		C	Z-23.138		
		C	Z-23.139		
OR 11-002A	Obsolete to be replaced by item No. 11-002				N-F2756
OR 11-002B	Obsolete to be replaced by item No. 11-002				N-F3082 US-17208 US-59003
OR 11-002C	Obsolete to be replaced by item No. 11-002				
OR 11-002D	Obsolete to be replaced by item No. 11-002				
11-003	METHYLETHYL-KETONE (MEK)	F	None	Solvent NOTE : FOR GENERAL APPLICATION YOU CAN USE 11-016, 11-026 OR 11-027	N-F0107 N-F3528 LOCAL PURCHASE
		D	None		
		GB	None		
		USA	ASTM D740		
		C	Z-23.117		
		AIB	AIMS 09-03-001		
OR 11-003A	Information transferred to item No. 11-003				
11-004	GENKLENE	F	None	Solvent trichloroethane NOTE : OZONE DEPLETING SUBSTANCE. FOR STRUCTURAL BONDING USE 11-003. FOR GENERAL APPLICATION (EXCEPT BONDING AND DECONTAMINATION OF OXYGEN PIPES) USE PREFERABLY 11-016 OR 11-026 OR 11-027	N-K6413 US-96717
		D	None		
		GB	None		
		USA	MIL-T-81533		
OR 11-004A OR 11-004B	BALTANE CHLOROTHENE NU				LOCAL PURCHASE

ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
11-005	FREON T-F	F	None	Cleaning of oxygen system lines NOTE : OZONE DEPLETING SUBSTANCE FOR GENERAL APPLICATION USE PREFERABLY 11-016, 11-026 OR 11-027	LOCAL PURCHASE
		D	None		US-32861
		GB	None		
		USA	MIL-T-81533		
OR 11-005A	FLUGENE 113 FORANE 113			Cleaning cartridge NOTE : OZONE DEPLETING SUBSTANCE FOR GENERAL APPLICATION USE PREFERABLY 11-016, 11-026 OR 11-027	N-F7860 N-K6413 US-1151B
11-006	METHYL ALCOHOL	F	None	Solvent	LOCAL PURCHASE
		D	None		
		GB	BS 506:66		
		USA	OM-232-Grade A		
			AMS3004		
			MIL-A-6090		
		C	Z-23.123		
11-007	SAN 10-1	F	None	Cleaning agent for crew oxygen masks	N-F0553 N-F5341
		D	None		
		GB	None		
		USA	None		
OR 11-007A	SAN 10-2				
OR 11-007B	SAN 50	F	None		N-F0553 N-F5341
		D	None		
		GB	None		
		USA	None		
OR 11-007C	KI-OSE No.320			Disinfectant for oxygen masks	*1255 FA2X6
11-008	Obsolete to be replaced by item No. 11-008A				
OR 11-008A	ALCOHOL BASED	F	None	Primer Cleaning	US-85570

ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
	8500/5200	D None		N-K5635
		GB None		
		USA None		
11-009	NONIDET	F None	Washing inside of tanks	ELLIS &
		D None		EVERAD
		GB None		BILLERI-
		USA None		CAY
				ENGLAND
				N-K 5591

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
11-010	ISOPROPYL ALCOHOL	F	AIR-3660	Cleaning	LOCAL PURCHASE
		D	None		
		GB	BS 1595:84		
		USA	TT-I-735		
			Grade A		
		C	Z-23.113		
11-011	AMS 1533 OPEN Exterior aircraft Cleaner gel type	F	None	Can be used for cleaning of APU air intake	N-F3172 US-61158 N-D8908 N-F2756
		D	None		
		GB	None		
		USA	AMS 1533		
11-012	NAPHTHA AND HEXANE	F	None	Solvent	LOCAL PURCHASE
		D	None		
		GB	None		
		USA	None		
		C	Z-23.103		
11-013	GTL COMPRESSOR CLEAN (GTE CC)	F	None	Compressor Cleaning	ROCHEM N-JERSEY USA
		D	None		
		GB	None		
		USA	MIL-C-85704		
OR					
11-013A	TC-100	F	None	Cleaning of APU compressor and APU oil cooler	OUTM6
		D	None		
		GB	None		
		USA	MIL-C-85704 Type II or IIA		
11-014	ZOK27	F	None	Cleaning of APU gas turbine compressor	N-U4628
		D	None		
		GB	None		
		USA	None		
		C	Z-23.215		
11-015	ALTUPOL1	F	None	Rain repellent cleaning	F2615
		D	None		
		GB	None		
		USA	None		
11-016	SAFETY SOLVENT CITRA SAFE VERSION WITHOUT ODOR	USA	BOEING BAC 5000 BAC 5504 BAC 5750	Solvent cleaning agent	*0290 US-01209

ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
11-017	AMS 1550 OPEN	F None D None GB None USA AMS 1550	Interior general plastic cleaner	Local purchase
11-018	AMS 1630 OPEN	F None D None GB None USA AMS 1630	Carpet and fabric cleaner	Local purchase
11-019	AMS 1535 OPEN	F None D None GB None USA AMS 1535	Cabin window cleaner	Local purchase
11-020	ALGLAS VISIAL	F None D None GB None USA None	Anti-static cleaner for VDU in the flight compartment	ALGLAS BRIXHAM ENGLAND
OR 11-020A	PROPHOT	F None D None GB None USA None	Anti-static cleaner for VDU in the flight compartment	
11-021	Information transferred to item No.11-010			
11-022	XYLENE FLUID	F None D None GB None USA ASTM D95-46B	Cleaning of fire and overheat detection sensing elements	LOCAL PURCHASE
11-023	BOLIT 707	F None D None GB None USA None	Cleaning of inside of the pane of windshield panels fitted with a self-healing liner	*0190

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
11-024	TURCO 4215 NC	F	None	Cleaning and degreasing	N-D8908
		D	None	agent-immerse procedure	US-61102
		GB	None	at 60-80 Deg.C-ALKAL	
		USA	None	cleaning before	
				cadmium-plating	
OR					
11-024A	BRULIN 815GD	F	None	Alkaline cleaning	*14110
		D	80-T-35-0020		US-94058
		GB	None		
		USA	None		
11-025	Information transferred to item No. 11-013A				
11-026	LOTOXANE	F	None	General solvant	N-U0968
	SOLVANT	D	None	cleaning	
		GB	ABR 9-0140		
		GB	DEF.STAN-		
			68-148/1		
		USA	None		
11-026A	CARECLEAN AS1	F	ASN-42202	Cleaning old greases	N-F3591
		D	None	and dust on engines	
		GB	None	mounts, bolts before	
		USA	None	use never-seez standard	
				grease	
11-026B	ISOPAR H	F	ASN-42202	General cleaner	US-29700
		F	AIMS 09-03-001	except non cured	
		D	None	sealant	
		GB	None		
		USA	None		
11-026C	LPS PRESOLVE	F	None		*0935
		D	None		US-66724
		GB	None		
		USA	None		
11-026D	DILUENT	F	ASN 42202	Cleaning of painted	
	DIESTONE DLS	AIB	AIMS 09-03-001	and unpainted metallic	
		GB	None	parts,thermoset parts,	
		USA	None	thermoplastic parts	
11-027	PURASOLVE ELS	F	AIMS 09-03-001		*1250
		D	None		
		GB	None		
		USA	None		
11-028	HONEY BEE 60	F	None	Acidic toilet system	US-2785L

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
			D	None	cleaner	
			GB	None		
			USA	None		
	11-029	FORALKYL 2050	F	None	Cleaning solvent for	N-F7860
			D	None	device using a rain	
			GB	None	repellent	
			USA	None		
	11-030	406R65-1	F	None		N-F0218
		RAIN REPELLENT	D	None		
		REMOVER	GB	None		
			USA	AMS 1526		
R	11-031	SOAP	F	None	Liquid soap for	LOCAL
R		(VISCOSITY LT	D	None	lavatory dispenser	PURCHASE
R		30 MPA/S)	GB	None		
R			USA	None		
	OR					
	11-031A	83-182	F	None	Cleaning solvent for	FAPE3
R		or 83-182/0X	D	None	device using a rain	
			GB	None	repellent	
			USA	None		
	11-032A	SOCOSOLV A3582	F	None	Used to remove TPS	N-F6892
			D	None	products	
			GB	None		
			USA	None		
R						
R	11-033	TURCO 6780	USA	SAE ARP 1755	No longer available	N1508B
R						US-1N6B3
R						US-45X02
R						N-08908
R						N-F6324
R						U-H3221
R						C-Q0706
R	11-034	GLY-VAK	AIB	AIMS 09-00-002	For preventive cleaning	US-18195
			D	None	and cleaning of toilet	FAPE3
			GB	None	pipes against deposit	
			USA	None	based on calcium and	
					magnesium compounds	

12.Strippers

ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
12-001	ARDROX 666/6	F AIR-8125 D None GB None USA MIL-C-19853	Stripper, carbon remover, agitated tank	N-F3082 US-59003 N-C1308
OR 12-001A	NETOIL SN6			N-F2756
OR 12-001B	Item not used			
OR 12-001C	COMORCAP T4	F AIR-8125 USA MIL-C-19853	Stripper, carbon Remover, agitated tank	N-F6892
12-002	Obsolete to be replaced by Item 12-005			
12-003	Obsolete to be replaced by Item 12-005			
12-004 OR 12-004A	Information transferred to item No.12-005 Information transferred to item No.12-005			

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	12-005	COMORCAP-B1/1 (Non Phenolic)	F	None	Stripper, alkaline activator. Used as selective STRIPPER for topcoats applied on resistant primer	N-F6892
			D	None		
			GB	None		
			USA	MIL-R-25134		
	OR					
	12-005A	Transfered to Item 12-007				
	OR					
	12-005B	COMORCAP B7 (Non phelonic)	F	None	Stripper Flexible polyurethane paint scheme applied on pickled, sanded sheet and for special application (sealants ...)	N-F6892
			D	None		
			GB	None		
			USA	MIL-R-25134		
	OR					
	12-005C	SPCA 7098A (Non phenolic)			Stripper, acid activator	N-F2756
	OR					
	12-005D	SIKKENS 82522 (Non phenolic)				N-F0351
	OR					
	12-005E	TURCO 5873NC (Non phenolic)	C	Z-12.704		N-D8908 N-F3172 US-61102
			USA	MIL-R-25134		
	OR					
	12-005F	COMORCAP B2 (Phenolic)	F	None	Used for epoxy and epoxy-polyurethane paint system applied on CAA, ALOCHROM ...	N-F6892
			D	None		
			GB	None		
			USA	MIl-R-25134		
	OR					
	12-005G	Information transferred to item No.12-010A				
	OR					
R	12-005H	Information transferred to item No.12-005				

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	12-005I	TURCO 5351 (Phenolic)	F	None	Stripper, acid activator	N-D8908
			D	None		N-F3172
			GB	None		US-61102
			USA	MIL-R-25134		
			C	Z-12.708		
	OR					
	12-005J	SCALPEX G5 (Phenolic)	F	None		N-F3163
			D	None		
			GB	None		
			USA	MIL-R-25134		
	OR					
	12-005K	ARDROX 2104 (Phenolic)				N-F3082
						US-59003
						N-C1308
	OR					
	12-005L	Information transferred to item No.12-010B				
	12-006	ORTHONETOIL P	F	None	Stripper, phenolic	N-F2756
			D	None		
			GB	None		
			USA	None		
	OR					
	12-006A	NETOIL 4452B	F	None	Stripper, non phenolic hot immersion	
			D	None		
			GB	None		
			USA	None		
	12-007	M-140-182	F	None	Final coat stripping	N-C0801
			D	None		
			GB	None		
			USA	None		
R	12-008	TS130/NC/5PB	F	None	Fire Plug Sealing Removal	N-FAPE3
R			D	None		SG-QB160
			GB	None		
			USA	None		
	12-009	Information transfered to item 11-021				
	12-010	ARDROX 2526	F	None	Adhesive remover	US-59003
			D	None		
			GB	None		
			USA	MIL-R-81294		
			USA	MIL-R-25134		
	OR					
	12-010A	COMORCAP B10 (Phenolic)	F	ISO SAE MA 4872	Removal for flexible polyurethane, offering also good result on certain epoxies covered	*0948
			D	None		N-C5543
			GB	None		N-F6892
			USA	None		N-KA739

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
					by polyurethanes	N-SF188
						N-09XNI
	OR					
	12-010B	TURCO 4377B	F	None	Stripper (phenol and	US-61102
			D	None	methyl chloride)	N-D8908
			GB	None		N-F3172
			USA	MIL-R-8633		
	12-011	TURCO 6840-S	F	None	Free from phenol and	N-D8908
			D	None	chlorinated solvent	N-F3172
			GB	None	stripper	US-61102
			USA	None		
			F	ISO SAE MA 4872		
	OR					
	12-011A	TURCO 6813-9X	F	None	Free from phenol and	N-D8908
			D	None	chlorinated solvent	
			GB	None	stripper	
			USA	None		
			F	ISO SAE MA 4872		
	OR					
	12-012	TURCO 6840-S	F	None	Free from phenol and	N-D8908
			D	None	chlorinated solvent	
			GB	None	stripper	
			USA	None		
			F	ISO SAE MA 4872		
			F	ISO SAE MA 4874		
	12-013A	CEE-BEE E-2012A	F	None	Paint stripper	
			D	None		
			GB	None		
			USA	None		
			F	ISO SAE MA 4872		
	OR					
	12-013B	SOCOSTRIP	F	None	Paint stripping	N-F6892
		A0102N	D	None	of intermediate coat	N-KA739
			GB	None		
			USA	None		
			F	SAE MA 4872		
R	12-014	TURCO 6776 L.O	F	None	Dyed version of CEE	N-F3172
R			D	None	BEE 1004 JN upon	N-D8908
R			GB	None	airfrance request	US-61102
			USA	None		
	OR					
	12-014A	CEE-BEE E-1004	F	None	Paint stripper same	
		JN	D	None	limitation as	
			GB	None	TURCO 6776 LO	
			USA	None		
	OR					

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	12-014B	ARDROX 2814	F	None	Paint stripper same limitation as TURCO 6776 LO	
			D	None		
			GB	None		
			USA	None		
	OR					
R	12-014C	STRIPPER SOCOSTRIP A0212	F	None	Paint stripper same limitation as 12-014	N-F6892
R			D	None		
R			GB	None		
			USA	None		
R	OR					
R	12-014D	CEE-BEE E-1004 J BLUE	F	None	Dyed version of CEE BEE 1004 JN same limitation as CML 12-014 acid activated pain stripper	US-3MCT7
R			D	None		C-QB160
R			GB	None		N-US702
R			USA	None		
R						
	12-015	TURCO 6881	F	None	Stripper, peroxide-based	N-F3172
			D	None		N-D8908
			GB	None		
			USA	None		
	OR					
	12-015A	NAPIER SV-35/PMA	F	None		
			D	None		
			GB	None		
			USA	None		
	OR					
	12-015B	TURCO 6930	F	None		N-F3172
			D	None		
			GB	None		
			USA	None		
	12-016	PAINTEX 2007B	F	None	Stripping of external paint on metallic surface	N-F2756
			D	None		N-QB160
			GB	None		
			USA	None		
	12-016A	SOCOSTRIP A0103N	F	None	Stripping of external paint on metallic surface	N-F6892
			D	None		N-KA739
			GB	None		
			USA	None		

13. Pretreatment for Painting

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
13-001	TURCO PRE-PAINT	F	None	Protective pretreatment	N-F3172
		D	None	for light alloys and	N-D8908
		GB	None	steels	US-61102
		USA	MIL-C-10578		
			Type II		
		USA	TT-C-490		
OR					
13-001A	ARDROX 1077	F	None		N-F3082
		D	None		US-59003
		GB	None		N-C1308
		USA	None		
13-002	ALODINE 1200	F	None	Protective pretreatment	N-F2865
		D	None	for light alloys	US-84063
		GB	None		
		USA	MIL-C-5541		
			Class I/A or		
			MIL-C-81706		
		C	Z-23.401		
13-003	ALODINE 1000	F	None	Protective pretreatment	N-F2865
	or	D	None	for light alloys	US-84063
	ALODINE 1500	GB	None		
		USA	MIL-C-5541		
			Class 3 or		
			MIL-C-81706		
		C	Z-23.403		
13-004	NOVEROX AX	F	None	Oxide conversion	N-C5077
		D	None	treatment	
		GB	None		
		USA	None		
13-005	TOUCH-N-PREP	F	None	Surface preparation	N-F6324
	ALODINE 1132	D	None	of aluminum	1607B
		GB	None		
		USA	None		

14. Disinfectants

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	14-001	Information transferred to item No. 14-001A				
	OR					
	14-001A	AMS 1476	F	None	Disinfectant and deodorant for toilets	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	None		
	OR					
	14-001B	Item not used				
	OR					
	14-001C	Item not used				
	14-002	ASEPTIC SPRAY DEODORIZER	F	None	For smoke masks, first-aid masks crew oxygen masks	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	None		
	14-003	Information transferred to item No. 14-003E				
	OR					
	14-003A	Information transferred to item 14-003E				
	OR					
	14-003B	Item not used				
	OR					
	14-003C	Item not used				
	OR					
	14-003D	Information transferred to item 14-003E				
	OR					
	14-003E	CALCIUM-HYPOCHLORIT	F	None	Disinfectant for the potable water system	*1330
			D	None		
	OR		GB	None		
	14-003F	SODIUM HYPOCHLORITE (OPEN)	USA	None		LOCAL PURCHASE
	OR					
	14-003G	Information transferred to item No. 14-003F				
R	OR					
R	14-003H	HERLISIL	F	None	Disinfectant	*0140
R			D	None		*2300
R			GB	None		N-C2164
R			USA	None		
R	OR					
R	14-003J	H BIO T50	F	None	Disinfectant hydrogen peroxide	N-FA009
R			D	None		
R			GB	None	Disinfectant for the potable water system	
R			USA	None		
R	OR					
R	14-003K	ELSIL 3% H2020	F	None	Disinfectant	N-K0389

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R			D	None	Disinfectant for the	
R			GB	None	potable water system	
R			USA	None		
R						
	14-003L	SANOSIL	F	None	Disinfectant for the	*1350
			D	DIN EN 902	potable water system	N-C8966

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	14-004	BLATTANEX 6741 OR BAYGON	F	None	Aircraft disinfectant insecticide (pest control).	N-D2203 N-F5546
			D	None		
			GB	None		
			USA	None		
	OR 14-004A	BLATTANEX 6764 SPRAY OR BAYGON SPRAY				
	14-004B	Information transferred to item No.14-006				
	14-004C	Information transferred to item No.14-010B				
	14-004D	KILBAT No.250	F	None	Long term residual effect on cockroaches after use	FA2X6
			D	None		
			GB	None		
			USA	None		
	OR 14-004E	PERMETHRIN EC10			For long term anti-insect treatment	
	14-005	Information transferred to item 14-006A				
	14-006	SAGROMED 2007 SPRAY	F	None	Disinfectant (spray)	N-D2215 N-F3458
			D	None		
			GB	None		
			USA	None		
	14-006A	QUARTASEPT	F	None	Disinfectant (liquid)	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	None		
	OR 14-006B	AMS 1452	F	None	Disinfectant aircraft general purpose	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	AMS 1452		
R	OR 14-006C	NETBIOKEM DSAM	F	EN 1040	Disinfectant liquid general purpose	N-FA2X6
R			F	EN-72-301		
R			F	EN-T-72-181		
R			USA	AMS 1453		

ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
14-007	Disinfectant AMS 1451	F None D None GB None USA AMS1451	Disinfectant after carriage of livestock	LOCAL PURCHASE
14-008	Lysol Liquid or Spray	F None D None GB None USA None	Cleaning agent with disinfectant efficiency	LOCAL PURCHASE
14-008A	PURE CLEANER DISINFECTANT	F None D None GB None USA AMS 1550	Cleaning agent with disinfectant efficiency	FAPE3
14-008B	RTU CLEANER DISINFECTANT	F None D None GB None USA AMS 1550	Cleaning agent with disinfectant efficiency	*3000
14-009	CO2 GAS	F None D None GB None USA None	To be used to fumigate aircraft i.e to kill rodents or reptiles as necessary	LOCAL PURCHASE
14-010	D-PHENOTHRIN	F None D None GB None USA None	For killing insects in aircraft cabin in flight	FA2X6
14-010A	PERMETHRIN 216, 217, 236	F None D None GB None USA None	Killing of insects in A/C cabin in flight	FA2X6
14-010B	AMS 1450 OPEN	F None D None GB None USA AMS 1450	Insecticide aircraft	FA2X6
14-011	PERMETHRIN No.240	F None D None GB None USA None	Insecticide for aircraft cargo compartment treatment after landing	FA2X6
14-012	KI-OSE No. 325, No.327	F NF T72-151 F NF T72-190 F NF T72-301 D None	General disinfection of A/C pax cabin and galleys	FA2X6

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
			GB	None		
			USA	None		
R	OR					
R	14-012A	NETBIOKEM DSAM	F	EN 1040	Disinfectant available	FA2X6
R			F	EN-72-301	INPPE impregnated wipes	
R			F	EN-T-72-181	or spray	
R			USA	AMS 1453		

15.Storage Preservation

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	15-001	Information transferred to item No.13-003				
	15-002	THERMOWELDABLE C-303	F	None	Thermoweldable fabric	N-F1375
			D	None		
			GB	None		
			USA	MIL-B-131 Type I		
			C	Z-11.409		
R	15-003	PELLICAL 119C	F	None	Temporary preservation coating	N-F6892
			D	None		
			GB	None		
			USA	None		
			C	Z-11.202		
R	OR					
R	15-003A	PROPACO SC	AIB	AIMS 04-04-015	Temporary protection of metal	N-F6892
R						N-FA2X6
R						N-02ER0
	15-004	WADIS 24	F	None	Water displacing compound	N-F6892
			D	None		
			GB	None	Corrosion preventive compound	
			USA	MIL-C-16173 Grade 3		
			AIB	TN 10138 Type I Grade 1		
	OR					
R	15-004A	ARDROX 3966	C	Z-11.121		N-F3082
			AIB	TN 10138 Type I Grade 1		US-17209
						US-59003
						N-C1308
	OR					
R	15-004B	Information transferred to item No.15-004				
R	OR					
R	15-004C	OPEN-NON DRYING OILY CPC	US	AMS 3066		
R			US	MIL-PRF-16173 GR 3 N		
R						
	15-005	SOCOPAC 25S	F	None	Temporary protective compound	N-F6892
			D	None		
			GB	None		
			USA	None		
			AIB	TN 10138 Type I Grade 2		
R			AIB	AIMS 09.08.001		
R				TI GR2		
			C	Z-11.121		
R			C	Z-11.502		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	OR					
	15-005A	LPS 3	AIB	TN 10138 Type I Grade 2		US-32861
			C	Z-11.102		
	OR					
R	15-005B	Information transferred to item No. 15-005				
	15-006	ARDROX AV 8	F	None	Temporary protective compound	N-C7223
			D	None		N-S5611
			GB	None		
			USA	None		
			AIB	TN 10138 Type I Grade 3		
			C	Z-11.102		
	OR					
	15-006A	SOCOPAC 25H	AIB	TN 10138 Type I Grade 3		N-F6892
	OR					
R	15-006B	Information transferred to item No. 15-006				
	OR					
R	15-006C	Information transferred to item No. 15-006				

	ITEM	DESIGNATION	SPECIFICATIONS			USAGE	COD.SPLR
	15-007	SOCOPAC 50S	F	None		Temporary protective	N-F6892
			D	None		compound	
			GB	None		Corrosion preventive	
			USA	None			
			AIB	TN 10138			
				Type II Grade 1			
R	OR						
R	15-007A	ARDROX 3209				No longer available	N-F3082
							US-17209
							US-59003
							N-C1308
	OR						
	15-007B	Item not used					
	OR						
R	15-007C	Information transferred to item No. 17-007					
	15-008	ARDROX AV 30	F	None		Temporary protective	N-C7223
			D	None		compound	N-S5611
			GB	None		Corrosion preventive	
			USA	None			
			AIB	TN 10138			
				Type II Grade 2			
			C	Z-11.103			
	OR						
	15-008A	ARDROX AV100D					N-C7223
							N-S5611
R	OR						
R	15-008B	SOCOPAC 50H	AIB	TN 10138		No longer available	N-F6892
				TypeII Grade 2			
R	OR						
R	15-008C	ARDROX 3313	AIB	TN 10138		No longer manufacturer	N-K6858
R				Type II Grade 2		temporary protective	N-F1705
			AIB	P01050.090.03		compound	N-C1308
R			CHN	Z-11-501			
	OR						
R	15-008D						
R	OR	Information transferred to item No. 15-008					
R	15-008E						
R	OR						
R	15-008F	ARDROX 3403	F	None			N-F1705
R			D	None			N-D1940
			GB	None			
			USA	None			
R			AIB	TN 10138			
				Type II Grade 2			
R	OR						
R	15-008G	PROCYON AB	AIB	TN 10138		Corrosion preventive	US-32861
R				Type II Grade 2		compound	
R			CHN	Z-11-503			

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R	15-009B	ARDROX AV30	F	None	Corrosion preventive compound TYPE III	N-D1940
			D	None		
			GB	None		
			USA	None		
			AIB	AIMS 09-08-003		
	OR					
R	15-009C	COR-BAN 35	F	None		N-F3102
			D	None		
			GB	None		
			USA	None		
			AIB	AIMS 09-08-003		

16.Structure Paints

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
R	16-001		F	TN 10118	No longer available	
			D	None		
R			GB	DTD-5580		
R			USA	MIL-C-7439		
R				Type II		
	OR					
R	16-001A	Information transferred to item No. 16-001				
	OR					
	16-001B	S-15/90	C	Z-12.105		N-H0951
		+Hard.S-66/22R				N-F0351
		or S-66/8RE				
		+Thin.C-25/90S				
	OR					
	16-001C	PAC-33				N-F1419
		(4355/3600)				
		+Hard.0701/9000				
		+Thin.0433/9000				
	or					
	16-001E	CA7045	AIB	AIMS 04-04-001	Anti-corrosion primer	N-F0229
		+ Hard CA7045B				N-K5635
						US-83574
R	16-002	F407-0729	F	None	No longer available	N-F3199
R		+Hard.F210-0731	D	None		N-K2054
R		+Thin.F851-808	GB	BAEP 3536		US-90608
R			USA	None		
	OR					
	16-002A	7-D-1586/2080	F	None		N-F0351
		+Hard.7-D-1586	D	None		N-H0951
		+Thin.3108	GB	None		
			USA	None		
	OR					
R	16-002B	Information transferred to item No. 16-002				
	OR					
R	16-002D	CA8351 + HARD	F	None	Internal finish	N-F0229
R		CA8310	D	None		N-K5635
R			GB	None		US-83574
			USA	None		
			AIB	AIMS 04-04-003		
	16-003	COATING	F	ASNB-70720		US-05803
		(OBSOLETE USE	D	DA-2-668-19		
		16-021)	GB	TH-5943/1		
			USA	None		
R	16-004					
R	OR	Information transferred to items No. 16-057 and No. 16-058				

	ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
R	16-004A OR 16-004B	Item not used			
	16-005	Obsolete to be superseded by item No.16-020.			

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R	16-006	F-580-2010	F	None	No longer available	N-F3199
R		+Hard.273/5076	D	None		N-K2054
		+Thin.850/805	GB	None		US-90608
			USA	None		
	16-006A	Item not used				
	16-006B	F-580-2080	F	None	Primer epoxy strontium	N-F3199
		+Hard.F275-160	D	None	chromate	N-K2054
			GB	None		US-90608
			USA	None		
			C	Z-12.113		
	OR					
R	16-006C	PR-143/C4334	F	None		AU-0370
R		+ACT.143/C4334	D	None		SG-0375
R		+ THINNER.T17	GB	None		US-83574
R		OR	USA	None		N-K5635
R		+ACT.143/C4334				
R		+ THINNER.T187				
	OR					
	16-006E	PR205 BASE/	F	None		N-K5635
		HARDENER	D	None		N-F0229
			GB	ABP 4-1123		
			USA	None		
	16-007	NEXTEL 3101-B2	F	None	Coating elastomeric,	N-F0347
		6018-8061	D	None	ultra low gloss	US-26066
			GB	None		
			USA	None		
	OR					
	16-007A	PYROLAC NC-4				N-F0351
						N-H0951
	OR					
	16-007B	4080 SEMI GLOSS	F	PQ10050-180	Temporary external	N-K5635
			D	None	paint	
			GB	None		
			USA	None		
	16-008	Information transferred to item No.16-018				
	16-009	NEXTEL 3101-A10	F	None	Coating elastomeric,	N-F0347
		6018-8061	D	None	ultra low Gloss, Mat	US-26066
			GB	None	white	
			USA	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	16-010	NEXTEL 3101-C10	F	None	Coating elastomeric,	N-F0347
		6018-8061	D	None	ultra low Gloss, Mat	US-26066
			GB	None	black	
			USA	None		
R	16-011	N-53652	F	None	No longer available	N-D8357
R		+Thin. N-38734	D	None	See CML 16-001 or	
R			GB	None	CML 16-060 primer	
			USA	None		
	16-012	N-59660	F	None	Erosion and antistatic	N-D8357
		+Hard.N-39/1327	D	DA-4-653-97	protection lacquer	
		+Thin.N-39/3460	GB	None	No longer recommended	
			USA	None	by AIB, use 07-006A	
	16-013	N-53628	F	None	Erosion protection	N-D8357
		+Hard.N-39/1327	D	DA-4-653-98	lacquer	
		+Thin.N-39/3460	GB	None	No longer recommended	
			USA	None	by AIB, use 16-031	
	16-014	NEXTEL 3101-S3	F	None	Coating elastomeric,	N-F0347
		6018-8061	D	None	ultra low Gloss, Light	US-26066
			GB	None	Grey	
			USA	None		
	16-015	FINCH	F	None	Center tank fuel anti	N-F0351
		473-13	D	None	vapor paint	N-H0951
			GB	None		
			USA	None		
			C	Z-12.409		

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
	16-016	C-21/100	F	None	External paint markings	N-H0951
		+Hard.S-66/8RE	D	None	(color as required)	N-F0351
		+Thin.C-25/90S	GB	None		
			USA	None		
	OR					
	16-016A	9050				N-F2613
		+Hard.9051				
	OR					
	16-016B	PU-66	F	None		N-F1419
		5440/XXXX	D	None		
		+Hard.0730/9000	GB	DTD-5580		
		+Thin.0491/9000	USA	None		
			C	Z-12.380		
	16-017	VALENTINE 08525	F	None	Used for repainting	N-F2613
		+Hard. 7867	D	None	landing Gear	
		+Thin. 8013	GB	None	locking device	
			USA	None	indicator	
R	16-018	N-53624	F	TN 10118	No longer available	N-D8357
		+Hard.N-39/1327	D	None		
R		+Thin.N-39/3259	GB	DTD-5580		
		or N-39/3460	USA	None		
	OR					
R	16-018A	HF-407	USA	MIL-C-7439	External applications	N-H0951
R		+Hard.S-66/8-RE		Type II		N-F0351
		+Thin.C-25/90-S				
R	OR					
R	16-018B	Information transferred to item No. 16-018				
R	OR					
	16-018C	PU-66 5440/XXXX	C	Z-12.380		N-F1419
		+Hard.0730/9000				
		+Thin.0491/9000				
	OR					
	16-018E	LOW VOC			Desothane HS CA8000	N-K5635
		EXTERIOR TOP				US-83574
		COAT				
R	OR					
R	16-018G	AVIOX FINISH	AIB	AIMS 04-04-013	External top coat	N-H0951
R		77702 + HARD				N-FAP52
R		90150 + ACTIV				N-F0351
R		98127				N-Z0123
R		OR + HARD 90150				US-98502
R		+ ACTIV 99321				
R		OR + HARD 90150				
R		+ ACTIV 99322				
R		OR + HARD 90150				
R		+ ACTIV 99330				

	ITEM	DESIGNATION	SPECIFICATIONS	USAGE	COD.SPLR
R		OR + HARD 90150			
R		+ ACTIV 99341			

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	16-019	Information transferred to item No.16-011				
	16-020	P-99	F	None	Wash primer	N-F1419
		7641/3600	D	None		
		+Hard.0841/9000	GB	None		
		+Thin.0434/9000	USA	None		
			C	Z-12.120		
	or					
	16-020A	METAFLEX FCR	AI	NT A.007.10113	Wash primer	N-FA4T1
						N-F0351
						N-H0951
						N-Z0123
						US-98502
	16-021	TITANINE	F	ASNB 70720	Polyurethane finish	N-K5635
		FE-50/6 HV	D	None	paint radio altimeter	
		+Hard. No. 34	GB	SL-1020	antenna installation	
		+Thin. TH-188		DTD-5580		
			USA	None		
			C	Z-12.524		N-F1419
	OR					
	16-021A	4125/2047	F	None		N-F1419
			D	None		
			GB	None		
			USA	None		
	OR					
	16-021B	CV116 AND	F	None		*1252
		ACTIVATOR ACT	D	None		
		34	GB	ABP 4-2128		
			USA	None		
R	OR					
R	16-021C	F69 BASE	F		Water based EPOXY	N-FABF2
R					coating	
R	16-022	Information transferred to item No.08-078				
	16-023	TIVOPAL 8357/5	F	None	Repair of foil	N-D9959
		+Thin.8200	D	None	covered components	
			GB	None		
			USA	None		
	16-024	CELOMER 5014	F	None	Primer coat	N-F1419
		BASE 5425/XXXX	D	None	polyurethane	N-K2232
		+HARD.0707/9000	GB	None		US-72556
		+THIN.0491/9000	USA	None		
			C	Z-12.214		
	or					
	16-024A	BASE:F566-4200	F	TN.A.007.10012	For composite material	*0370
		+ HARD:N39/1327		Type II	primer coat	*0375

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
		+ THINNER N39/3460	F	AIMS 0404-002		N-K5635
			D	None		US-83574
			GB	None		
			USA	None		
			C	Z-12.214		
	or 16-024B	BASE LC756975 + ACCELERATOR FL4206 + THINNER F4 4207	F	None	No longer available	
R			D	None	See CML 16-024	
R			GB	None		
			USA	None		
	or 16-024C	BASE : 37045 + HARD:S66/14 For Faster Drying S66/22R + THINNER C25/90S	F	TN.A.007.10012	Primer for composites	N-FA4T1
			F	AIMS 0404-002		N-F0351
			D	None		N-H0951
			GB	None		US-20123
			USA	None		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	16-029	PU-66 5447	F	None	Radome	N-F1419
		+HARD-0730/9000	D	None		N-K2232
		+THIN-0491/9000	GB	None		
			USA	None		
			C	Z-12.380		
	16-030	Obsolete to be replaced by item No.07-006A				
R	16-031	INTERFLEX	F	None	No longer available	N-F1419
R		5470/0000	D	None	replaced by item 16-031	N-K2232
R			GB	None	with suffix	
			USA	None		
			C	Z-12.541		
	OR					
	16-031A	CELOFLEX	F	None	Painting of radome	N-K5635
		5478/XXXX	D	None		
		+HARD 0778/9000	GB	None		
		+THIN 0470/9000	USA	None		
	16-032	F 407-0702	F	None	Black paint used for	N-D8957
		+HARD F210-731	D	None	marking of torqued	
		+THIN 851-808	GB	BAEP 3536	bolts abrasion	
			USA	None	resistant brush	
					application	
	16-033	463-6-11	F	None	Epoxy Primer (Green)	N-F0351
		+Hard.X315	D	None	For Landing Gears.	
		+Thin.TL65	GB	None	Hydraulic Fluid	
			USA	BMS 10-11,	resistant	
				Type I		
	16-034	643-3-9	F	None	Polyurethane top coat	N-F0351
		+Catalyst X310A	D	None	(Grey) For landing	
		+Reducer TL59	GB	None	Gears Hydraulic Fluid	
			USA	BMS 10-60	resistant	
				Type I		
	16-035	Information transferred to item No.16-016				

ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
16-036	Information transferred to item No.16-018				
16-037	Information transferred to item No.16-020				
16-038	Information transferred to item No.16-001				
16-039	Information transferred to item No.16-018				
16-040	37045	F	None	For treatment of	N-H0951
	+ HARD S66/22R	D	None	external spoiler	
	+ THIN C25/90S	GB	None	surfaces	
		USA	None		
		C	Z-12.129		
16-041	METAFLEX WR	F	None	For treatment of	N-H0951
	+ HARD META.WR	D	None	external spoiler	
	+ THIN C25/90S	GB	None	surfaces	
		USA	None		
16-042	Information transferred to item No.16-018				
or					
16-042A	CV 121 +	F	None		N-K5635
	ACTIVATOR ACT34	D	None		
	+ THINNER T74	GB	ABP4-2124		
		USA	None		
16-043	Information transferred to item No.16-020				
16-044	Information transferred to item No.16-001				

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	16-045	FINALIN No. 2	F	None	Sealant porefiller for furnishing part	MANKIE-WICZ 92310 SEVRES N-D2603
			D	None		
			GB	None		
			USA	None		
	OR					
	16-046	ALEXIT FST 414-12 + THIN T105	F	None	Primer for furnishing part	MANKIE-WICZ 92310 SEVRES N-D2603
			D	DAN1278		
			GB	None		
			USA	None		
	OR					
	16-046A	ALEXIT FST 343-55 + HARD ALEXIT 345-15	F	None	Water based product for interior paint system	N-D2603
			D	None		
			GB	None		
			USA	None		
			AIB	ABS5650A		
	OR					
	16-046B	FR 1/55 (BASE/ HARDENER)	F	None	Water based product for interior paint system	FAPE3
			D	None		
			GB	None		
			USA	None		
			AIB	AIMS 04-08-001		
	OR					
	16-046C	FRS 30 (BASE/ HARDENER/ THIN FRSL)	F	None	Water based product for interior paint system	FAPE3
			D	None		
			GB	None		
			USA	None		
			AIB	AIMS 04-08-001		
	16-047	ALEXIT FST 404-12	F	ASNA-3687	Decorative paint for thermoplastic and metallic furnishing part	MANKIE-WICZ 92310 SEVRES N-D2603
			D	DAN 1200		
			GB	None		
			USA	None		
			C	Z-12.381		
R	OR					
R	16-047A	ALEXIT FST 346-55 + HARDENER ALEXIT 345-55	AIB	ABS 5650B	Water based product for interior paint system	N-D2603 US-0995
R			AIB	AIMS 04-08-002		
	16-048	DE SOTO 420-HS	F	None	Polyurethane topcoat paint surfaces	US-85570
			D	None		
			GB	None		
			USA	BMS 10-60 Type II Class B Group A		
	16-049	DE SOTO	F	None	Urethane compatible	US-85570

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
		513 X 377	D	None	fluid resistant epoxy primer	
			GB	None		
			USA	BMS 10-79 Type II		
	16-050	LAMINAR X-500	F	None	Repair of elevator surfaces	US-33564
			D	None		
			GB	BAC 5837		
			USA	None		
			C	Z-12.203-1		
	16-051	PU-66 (5467/0000 + 0735/9000)	F	None	Repair and repainting of composite surfaces	N-K5635 US-83574
			D	None		
			GB	None		
			USA	None		
			C	Z-12.211-1		
	16-052	EPIBOND 156 A/B	F	None	Repair and repainting of composite surfaces	OEJE3
			D	None		
			GB	None		
			USA	None		
			C	Z-12.203.3		
R	16-053	ALEXIT-FST 495-14 + HARD 491-14	F	None	Filler for core and edge (2 parts)	N-D2603
R			D	DAN 1282-01		N-FAPE3
			GB	None		
			USA	None		
	16-054	HYSOL EA960F	F	None	Repair of composite surfaces	US-04347
			D	None		
			GB	None		
			USA	None		
			C	Z-12.210-1		
	16-055	BASE 463-12-8, HARDENER CA116, THINNER C25/90S	F	None	Epoxy primer to be applied on the nose landing gear leg before polyurethane paint material 16-035	N-H0951
			D	None		
			GB	None		
			USA	None		
	16-056	BASE :PU66 5469/0181 THINNER : 0491/9000 HARD : 0730/9000	F	ASNB 70610	To apply on the over wing escape pass	*0370
			D	None		
			GB	None		
			USA	None		
R	16-057	BASE 825-009	AIB	AIMS 04-04-019	High temperature areas	N-F1419
R		+ HARDENER				N-FAAK9

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R		910-175				AU-Z0853
R		+ THINNER				
R		020-044				
R	16-058	BASE 529K002		AIMS 04-04-021		N-F1419
R		+ HARDENER				AU-Z0853
R		910K021				
R	16-059	DESOTHANE HS	AIB	AIMS 04-04-013	No longer available	US-83574
R		CA 8000 BASE				N-F0229
R						N-K5635
R	OR					
R	16-059B	ALEXIT HS	AIB	AIMS 04-04-032	Top coat forman	US-0995
R		411-77 + ALEXIT			external pain scheme	N-D2603
R		HARDENER 405-77				AU-Z0123
R		+ ALEXIT				
R		ACTIVATED THIN				
R		902-27				
R		OR				
R		ALEXIT HS				
R		411-77 + ALEXIT				
R		HARDENER 405-77				
R		+ ALEXIT				
R		ACTIVATED THIN				
R		902-37				
R		OR				
R		ALEXIT HS				
R		411-77 + ALEXIT				
R		HARDENER 405-77				
R		+ ALEXIT				
R		ACTIVATED THIN				
R		902-47				
R		OR				
R		ALEXIT HS				
R		411-77 + ALEXIT				
R		HARDENER 405-77				
R		+ ALEXIT				
R		ACTIVATED THIN				
R		902-57				
R		OR				
R		ALEXIT HS				
R		411-77 + ALEXIT				
R		HARDENER 405-77				
R		+ ALEXIT				
R		ACTIVATED THIN				
R		902-67				
R	16-061	DESOTHANE	AIB	AIMS 04-04-026	Wing coating	US-83574
R		CA8900 M09004				N-F0229

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R		BASE + HARD CA8000B + THIN CA8000C3				N-K5635
R	16-062A	CELEROL INTERMED COAT 990-09	AIB	AIMS 04-04-032	Put coat for MANKEXICZ external paint scheme	US-0995 N-D2603 AU-Z0123
R	16-064	ALEXIT H/S BASE COAT 411-22	FR FR	AIMS 04-04-033 AIMS 04-04-037	Base coat external paint scheme	US-0995 N-D2603 AU-Z0123
R	16-065	ALEXIT H/S CLEAR COAT 411-14	AIB	AIMS 04-04-023	Clear coat for base coat external paint scheme	US-0995 N-D2603

17.Microbiological Contamination Protection Materials

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	17-001	STRONTIUM CHROMATE TABLET	F	None	Microbiological protection and corrosion preventive	N-K0400
			D	None		N-2D671
			GB	S27-4001		
			USA	None		
	17-002	Item not used				
R	17-003	BIOBOR JF	F	None	No longer available in Europe	N-K3714
R			D	None		US-24611
			GB	None		
			USA	None		
	17-003A	KATHON FP1.5 Biocide for fuel Preservation	F	None	Biocide for use in aircraft fuel system	*1260
			D	None		*1261
			GB	None		N-K0F88
			USA	None		N-SD385

18. Not Applicable

19.Miscellaneous

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	19-001	WIRE, SS, BRAIDED 16/2/38SWG	F	None	For lacing hot air and anti-icing duct insulation muffs	N-K8319
			D	None		
			GB	None		
			USA	None		
			OTH	16/2/38 SWG		
	19-002	SYNTHETIC FIBRE CORD	F	NSA 8420-0	General Use	Local Purchase
			D	None		
			GB	None		
			USA	MIL-T-713		
	19-003	LINT FREE COTTON CLOTH	F	None	Cleaning	Local Purchase
			D	None		
			GB	None		
			USA	AMS 3819		
	19-004	WHITE TALCUM POWDER	F	None	Fuel leak detection	Local Purchase
			D	None		
			GB	None		
			USA	None		
	19-005	WAX CRAYON	F	None	Marking fuel leak area	Local Purchase
			D	None		
			GB	None		
			USA	None		
	19-006	PIPE CLEANERS	F	None	Cleaning structural channels prior to sealing	Local Purchase
			D	None		
			GB	None		
			USA	None		
R	19-007	NM 220 DTEX 4x3	F	None	Aids removal of sealant in seat tracks	N-2200
R			D	Dan 90-60A		
			GB	None		
			USA	None		
R	19-008	7840/3 Ligature cord	F	NSA 8420-0	Removal of sealant	N-2200
			D	None		
			GB	None		
			USA	None		
	19-009	LOCKWIRE 0.5 mm	F	None	Safety wiring of components and connectors	LOCAL PURCHASE
			D	LN 9424		
R		(AMS 5687)	GB	DTD 189		FAPE 3
			USA	AMS 5687		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
	19-010	LOCKWIRE 0.8 mm (AMS 5687)	F	None	Safety wiring of components and connectors	LOCAL PURCHASE
			D	LN 9424		
			GB	DTD 189		
			USA	AMS 5687		
	19-011	SCOTCH BRITE PADS	F	None	Abrading surface prior to sealing	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	None		
	19-012	ALUMINUM WOOL	F	None	Abrading/polishing surface prior to sealing	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	None		
	19-013	FC-87 FURON PTFE	F	None	Restore the original material	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	AMS3667G Type I		
			C	Z-14.501		
	19-014	NITROGEN (GASEOUS)	F	None	For charging shock absorber	LOCAL PURCHASE
			D	None		
			GB	None		
			USA	MIL-P-27401		
			USA	Type I, Grade A		
	19-015	TEDLAR TGY20BE3	F	None	Polyvinyl fluoride film used on the elevator FS/access holes	US-88559
R			D	DAN95K		N-B0589
R			GB	None		N-C2312
			USA	BMS 8-98		
				Type 3 class 2		
			USA	L-P-1040B		
			C	Z-14.510		

	ITEM	DESIGNATION		SPECIFICATIONS	USAGE	COD.SPLR
R	19-016	TEDLAR	F	None	THS T.E Panels and	N-B0589
R		TWH10BS3	D	DAN95C	coverq repair and	N-C2312
			GB	None	reprotect	
			USA	BMS 8-98		
				Type 3 class 1		
			C	Z-14.512		
	19-017	LOCKWIRE	F	None	Safety wiring of	LOCAL
		1.25 mm	D	LN 9424	components and	PURCHASE
			GB	DTD 189	connectors	
			USA	AMS 5687		
	19-018	LOCKWIRE	F	None	Safety wiring of	LOCAL
		0.6 mm	D	LN 9424	components and	PURCHASE
			GB	DTD 189	connectors	
			USA	AMS 5687		
	19-019	BIOCLEANSE	F	None	To absorb liquid spills	*0309
			D	None	(fuel, oil, hydfliud	
			GB	None	etc) in hangars, work-	
			USA	None	shops or on the ramp	
					if necessary	
	OR					
	19-019A	CLAY ABSORBENT	F	None	Absorbent	
		OR BIOCLEAN	D	None		
			GB	None		
			USA	None		
	19-020	NYLON BS 5F	F	None		Local
		120 NT4 OR	D	None		purchase
		NYLON BS 5F	GB	BS 4F1204B		
		120 NT4B	GB	BS 4F120NT4		
			USA	None		
	19-021A	GETAFIL N ET.40	F	ABS5677AA	Lancings to set	N-C4179
			D	None	insulation blankets	
			GB	None		
			USA	None		
	19-022	AIRFRESHENER	F	None	To blanket cabin odours	FA2X6
		No. 108 + No.	D	None		
		160	GB	None		
			USA	None		
R	19-023	REF 7	F	None	No longer available	D9261
			D	None		
			GB	None		
			USA	None		
R	OR					

	ITEM	DESIGNATION	SPECIFICATIONS		USAGE	COD.SPLR
R	19-023A	REF 8-5	F	None	Test gaz for smoke	S3464
R			D	None	detector	
R			GB	None		
R			USA	None		
	19-024	SAN 40	F	None	To wipe fullface mask	N-F0553
		LENS CLOTH	D	None	window inside and	
			GB	None	outside	
			USA	None		
	19-027	NSA 3811-0	F	NSA3811	1 mm dia, breaking	N-F0553
		WHITE CORD-	D	None	strength 39.2 dan	
		BRAIDED	GB	None		
		(NYLON)	USA	None		
R	19-028A	VILEDON	FR	ABS1129	Ice filtering	N-D2480
R		P15-1505	GB	EN779		
R	19-029	CLEANING OIL	F	None	Cleaning oil used with	N-DD471
R		LI AZR	D	None	greasing tool GSE	
R			GB	None	44SSA0000-01	
R			USA	None		

TITANIUM ITEMS

1. General

This section deals with instructions for cleaning titanium which has been contaminated by undecomposed or decomposed fire resistant hydraulic fluid. Fire resistant hydraulic fluid decomposes into an acidic fluid or solid, beginning at 260°C (500°F), which reacts rapidly with titanium. The result of such reaction is pitting in the initial stages, followed by cracks or rupture in the latter stages.

WARNING : CLEANING OPERATIONS USING SOLVENTS SHOULD BE PERFORMED IN A WELL-VENTILATED ATMOSPHERE

2. Equipment and Materials

ITEM	DESIGNATION
A.	Lint-Free Cloth
B. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
C.	Abrasive Pads
D.	Sandblast Equipment (150 Mesh)
E.	Plastic Scraper
F.	Aluminium Oxide Powder

3. Checks

A. Titanium parts exposed to fire resistant hydraulic fluid that has been subject to thermal decomposition require no special treatment other than repair of damaged paint areas. In such case, where paint or primer has been attacked by hydraulic fluid, protective finish must be removed down to bare metal and surfaces thoroughly checked.

B. Titanium parts evidencing attack by chemical compounds must be thoroughly checked to ensure structural integrity.

4. Cleaning/Painting

CAUTION : DO NOT USE CHLORINATED SOLVENTS FOR CLEANING

A. Cleaning of Titanium Parts Contaminated with Non-Decomposed Fire Resistant Hydraulic Fluid.
   (1)Remove hydraulic fluid from titanium using a dry lint-free cloth.
   (2)Wipe area with lint-free cloth dampened with Material No.11-002.

B. Cleaning of Titanium Parts Contamined with Thermally Decomposed Fire Resistant Hydraulic Fluid
   (1)Remove hydraulic fluid from titanium using a dry lint-free cloth.
   (2)Wipe area with lint-free cloth dampened with Material No.11-002.
   (3)Clean entire surface down to bare metal using an abrasive pad.
   (4)In the event that abrasive pad proves inadequate, use plastic scraper then sandblast with aluminium oxide.
   (5)Thoroughly wipe over surface with lint-free cloth dampened with Material No.11-002.

5. Rejection Criteria

A. Titanium parts that are etched, pitted or cracked must be immediately repaired or removed.

B. Titanium parts which have a dull appearance without other visible defect need not be removed. However, depending upon whether they are exposed to high temperature conditions, they may have suffered a reduction in their mechanical properties. An engineering review of such parts is therefore recommended.

6. Approved Repairs

Titanium parts that are etched, pitted or cracked are permanently embrittled and must be replaced.

However, minimum repairs may be undertaken in accordance with engineering instructions.

NOTE : A surface repair does not necessarily imply that an embrittled part is fully reconditioned since embrittlement of entire thickness of part is problable.

Degree of titanium embrittlement can only be determined by laboratory analysis.